TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL

147 POND ST
FRANKLIN, MA 02038

STORMWATER MANAGEMENT REPORT

Submitted to:
Town of Franklin Conservation Commission
Massachusetts Department of Environmental Protection

Prepared for:
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TRI-COUNTY VOCATIONAL HIGH SCHOOL
STORMWATER MANAGEMENT NARRATIVE
FRANKLIN, MA

JUNE 2024

Introduction

The existing Tri-County Regional Vocational school site is located at 147 Pond Street in Franklin. The existing school building, constructed in 1977, is a multi-level steel framed, masonry clad building of approximately 285,000 square feet. The site is approximately 60.3 acres. There have been no additions.

The property is abutted by single family residences to the North and West. A larger condominium complex is located to the South/Southeast of the existing site. An open, wooded lot owned by the Town's Affordable Housing Trust is located to the east. The existing site has frontage along both Pond and Old West Central Street. The site slopes downgradient 80-100 feet in height from north/northeast to south/west, with the high point northeast of the property and the low point(s) at the bordering vegetated wetlands resource areas along the south and west portions of the site. All proposed development will occur on the northern/eastern sides of the wetlands delineation.

The Tri-County High School development will include a new, compact, three-story, rectangular design fitting into the available buildable area into the sloping behind the existing school. The building will be located on a newly created level area and will be accessed by both the existing driveway and a new access drive from the existing access road. The main entrance will be the focal point of the new entrance drive; framed by the three-story vertical stair tower and sloping roof of the library/learning commons. The proposed site includes reconfigured athletic fields, parking/drive aisles, pedestrian connectivity (via sidewalks), landscaping, new utilities and a proposed stormwater management system designed in accordance with the Massachusetts DEP Stormwater Standards, as well as the Town of Franklin Stormwater Bylaw.

Soils:
Soils on the site consist of a mix of hydrological "A", "C", and "D" Soils. The soils resource report, and test pit results conducted on January 16 and March 12, 2024 are located in the Appendix of this report (Note: Two separate reports are included by OTO, Project geotechnical engineers). Soils were generally found to be glacial till with low hydraulic conductivity results (K values < 1ft/day based on infiltrometer testing). Groundwater elevations fluctuated between 3'-9' depending on locations.

Existing Stormwater Management:
The site is 60.3± acres in size, with the existing school building, constructed in 1977, a multi-level steel framed, masonry clad building of approximately 285,000 square feet and existing athletic fields. The existing stormwater management on the property consists solely of stormwater conveyance with a series of catch basins and drainage manholes, excluding any use of Best Management Practices (BMPs) throughout the site to meet the MassDEP Stormwater Standards for stormwater. The site does not include mitigation for stormwater quantity or quality.

Proposed Stormwater Management System:
The proposed post-development stormwater management system consists of a series of catch basins/drain manholes/water quality units that convey site run-off to one of four (4) underground detention and/or infiltration systems. Detention system #1 is located to the east of the proposed school building within the rear driveway, Detention system #2 is located Southeast of the proposed school building and east of the parking lot area, Infiltration system #3 is located west of the new building within the new front parking lot, and Infiltration system #4 is located within a new parking lot near the site entrance. The underground systems ultimately discharge to existing wetland resource

areas and the project's Point of Analysis. It should be noted that underground lined detention systems are being proposed in earthwork cut areas that are within the determined maximum groundwater elevations; as such infiltration requirements for these areas will not be met.

Methodology/ Procedure

Objective:
The objective of the stormwater management for the site is to improve mitigation of stormwater quality and treatment of any increase in peak storm runoff rates due to the construction of the proposed project. Outlined below are the numerous stormwater best management practices (BMP's) proposed to be used.

Proposed Stormwater Control Systems:
The following are the proposed Best Management Practices (BMP's) stormwater control systems to be used on the site to mitigate an increase in peak stormwater runoff and improve water quality:

Subsurface Structures (Infiltration Chambers): Subsurface structures are underground systems that capture runoff (Detention system), and gradually infiltrate it into the groundwater. There are a number of underground infiltration systems that can be installed to enhance groundwater recharge. Subsurface structures are constructed to store stormwater temporarily and percolate into the underlying soil. They are feasible only where the soil is adequately permeable and the maximum water table and/or elevation is sufficiently low. They can be used to control the quantity as well as quality of stormwater runoff, if properly designed and constructed. The structures serve as storage chambers for captured stormwater, while the soil matrix provides treatment.

Subsurface Detention system (Lined): Subsurface Detention structures are underground systems that capture runoff and gradually discharge it to stormwater conveyance systems to reflect pre-existing run-off conditions. Infiltration is prohibited for these systems as the soil maximum water table and/or elevation is not low enough to create the required minimum separation. They can be used to control the quantity as well as quality of stormwater runoff, if properly designed and constructed. The structures serve as storage chambers for captured stormwater.

Deep Sump Catch Basins: A deep sump catch basin (also known as oil and grease or hooded catch basins) acts as underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff, and serve as temporary spill containment devices for floatables such as oil and grease that provides pretreatment. A 25% TSS removal is awarded to the deep sump catch basin when used as pre-treatment.

Water Quality Units (WQUs): Water Quality Units are a flow-through structure with a settling or separation unit to remove sediments and other pollutants. They typically use the power of swirling or flowing water to separate floatables and coarser sediments, are typically designed and manufactured by private businesses, and come in different sizes to accommodate different design storms and flow conditions. Since proprietary separators can be placed in almost any location on a site, they are particularly useful when either site constraints prevent the use of other stormwater techniques or as part of a larger treatment train. Generally, they are placed below ground and contain inspection and access ports so that they may be inspected and cleaned.

Watershed Routing

Below is a summary of the various existing and proposed watersheds with a brief narrative describing the routing. The descriptions of the watersheds are depicted in sketches EX-WS and P-WS located in the Appendix.

Existing Watersheds:

Ex-Watershed-1: This watershed consists mainly of the northern portion of the existing school building, northern Athletic Fields, and a portion of the western satellite parking area. Stormwater runoff from this watershed runs offsite through existing drainage pipes.

Ex-Watershed-2: This watershed consists mainly of the existing school building including the main entrance and concrete walkways, eastern side of the baseball field, and a portion of the satellite parking lot adjacent to the west portion of the existing school building connected to the access road. Stormwater runoff from this watershed to the wetlands on the southwestern portion of the site (POA-2).

Ex-Watershed-3: This watershed consists of the southern section of the main parking lot consisting mainly of asphalt and green space. Stormwater runoff from this watershed to the wetlands on the southwestern portion of the site (POA-2).

Ex-Watershed-4: This watershed consists of the northern section of the main parking lot and a portion of the access driveway. Stormwater runoff from this watershed to the wetlands on the southwestern portion of the site (POA-1).

Ex-Watershed-5: This watershed consists mainly of the southern section of the rear parking lot and the south side of the existing building. Stormwater runoff from this watershed to the wetlands on the southern portion of the site (POA-1).

Ex-Watershed-7: This watershed consists mainly of the wetland tributary area west of the main parking lot field parallel with the access road to the school campus. Stormwater runoff from this watershed to the wetlands on the southwestern portion of the site (POA-2).

Ex-Watershed-8: This watershed consists mainly of the wetland tributary area south of the main parking lot field adjacent with the access road to the school campus. Stormwater runoff from this watershed to the wetlands on the southern portion of the site (POA-1).

Ex-Watershed-9: This watershed consists mainly of the west side of the existing solar field area to the east of the rear parking lot of the existing building. Stormwater runoff from this watershed to the wetlands just south of the solar fields of the site (POA-5).

Ex-Watershed-10: This watershed consists mainly of the east side of the existing solar field area to the east of the rear parking lot of the existing building. Stormwater runoff from this watershed to the wetlands just south of the solar fields of the site (POA-5).

Ex-Watershed-13: This watershed consists mainly of the grass/wooded area of the parking lot behind the existing school building. Stormwater runoff from this watershed runs southeast through a grass channel to the site POA-4.

Ex-Watershed-14: This watershed consists mainly of the southeast side of the existing wetland basin SW comprising of grass/ wooded area. The stormwater runoff from this watershed runs to the southwest to POA-5.

Ex-Watershed-15: This watershed consists mainly of the grass/wooded southern portion of the existing site along the east side of the existing gravel path. The stormwater runoff from this watershed runs to the southern bordering vegetated wetlands series D (POA-6).

Ex-Watershed-16: This watershed consists of the northern portion of wood to the north of the existing solar fields. The stormwater runoff from this watershed runs to the east of the site to (POA-8).
Proposed Watersheds (PWS):

Ex-Watershed-17: This watershed consists of the southern portion of the site within the grass/wooded area and the access road to Tri-County Regional Vocational High School. The stormwater runoff from this watershed is collected via a catch basin along the access road and moves off site to (POA-7).

Ex-Watershed-18: This watershed consists of the Northern most portion of the site with grass/wooded area within the north most athletic field area. The stormwater runoff from this watershed goes to site (POA-9) just east of the watershed area.

Ex-Waterhsed-19: This watershed consists of a portion of the access road to Tri Conty Regional Vocational High School that is asphalt. The stormwater runoff for this watershed is captured per a catch basin along the access road and released at the site (POA-1).

Proposed Watersheds:

PR-Watershed-1: This watershed consists of the proposed rear drive aisle of the proposed development. Stormwater runoff is conveyed through catch basins and underground piping to BMP #1 (east of the proposed school building) before discharging to BMP-2 and then to the existing stormwater conveyance system to POA-1.

PR-Watershed-2: This watershed consists of the south side drive aisle and parking lot adjacent to the south side of the proposed building. Stormwater runoff in catch basins, and underground piping to BMP #2 (south of the proposed school building) before discharging to the existing stormwater conveyance system to POA-1.

PR-Watershed-3: This watershed consists of the new front parking area/access driveway to the west of the site, eastern side of school building, bus drop off aisle, and landscape area. The stormwater from this watershed is captured via roof leaders, catch basins, drain manholes and BMP#3 prior to discharging to the wetlands (POA-2) through a 15" culvert.

PR-Watershed-4: This watershed consists of the parking lot east and south of the grass athletic fields. The stormwater from this watershed is captured via catch basins, drain manholes to infiltration system #4 prior to discharging to the wetlands (POA-2) through a 24" culvert.

PR-Watershed-5: This watershed consists of grassed athletic fields to the north of the site. The stormwater from this watershed sheet flows inlets to an existing 30" RCP drain line and through existing stormwater conveyance system to POA -3.

PR-Watershed-6: This watershed consists of an area west of the main drive aisle. The stormwater from this watershed is captured via catch basins, drain manholes and directed to BMP#4 prior to discharging to the southwest wetlands (POA-2) through a 24" culvert.

PR-Watershed-7: This watershed consists of the proposed areas east of the baseball field and existing wetland resource areas. The stormwater from this watershed is picked up via inlets and underdrains and directed to the bordering vegetated wetlands to the south depicted as POA-1.

PR-Watershed-8: This watershed consists of the proposed areas west baseball field and wetland tributary area. The stormwater from this watershed is picked up via inlets and underdrains and directed to the bordering vegetated wetlands to the south depicted as POA-2.

PR-Watershed-9: This watershed consists of the parking lot west and south of the athletic fields. The stormwater from this watershed is captured via catch basins, drain manholes and directed to BMP#4 prior to discharging to the wetlands (POA-2) through a 24" culvert.

PR-Watershed-10: This watershed consists of mainly an area to remain untouched in the proposed development scheme found to the northeast consisting of mainly wooded area and moss. Stormwater runoff from this watershed to the wetlands east off site (POA-9).

PR-Watershed-11: This watershed consists of mainly an area to remain untouched in the proposed development scheme found to the southeast and west of the site consisting of mainly wooded area and moss. Stormwater runoff from this watershed to the wetlands just south of the solar fields of the site (POA-5).

PR-Watershed-12: This watershed consists of an area to remain untouched in the proposed development scheme, south of that vegetated swale and a wetland replication area. The watershed runoff will run into the wetland replication area and discharge into (POA-5).

PR-Watershed-13: This watershed consists of mainly an area to remain untouched in the proposed development scheme found to the northeast of the site consisting of mainly wooded area and grass. Stormwater runoff from this watershed to the wetlands east off site (POA-8).

PR-Watershed-14: This watershed consists of the Northen building proposed development. Stormwater runoff is conveyed through roof leaders and underground piping to BMP #1 (east of the proposed school building) before discharging to BMP-2 and then to the existing stormwater conveyance system to POA-1.

PR-Watershed-15: This watershed consists of the Southern east side of the proposed building development. Stormwater runoff is conveyed through roof leaders and underground piping to BMP #2 and then to the existing stormwater conveyance system to POA-1.

PR-Watershed-16: This watershed consists mainly of the grass/wooded southern portion of the existing site along the east side of the existing gravel path. The stormwater runoff from this watershed runs to the southern bordering vegetated wetlands series D (POA-6).

PR-Watershed-17: This watershed consists of concrete walkways, landscaped area, and some of the drive aisle to the south side of the proposed building. The stormwater runoff from this watershed runs to the proposed catch basin along the proposed access road and discharges to POA-1 through existing drainage conveyance systems.

PR-Watershed-18: This watershed consists of the proposed access drive off the main road drive aisle to Tri County Regional Vocational High School, grass/wooded area, and the main aisle drive to Tri County Regional Vocational High School. The stormwater runoff is collected to an existing catch basin conveyance system and runs off the site (POA-7).

PR-Watershed-19: This watershed consists of newly proposed grass landscaping along the northern end of the proposed access drive. The stormwater runoff for this watershed is off site and to POA-4.

PR-Watershed-20: This watershed consists of concrete walkway, landscaped areas, and intersection to the proposed central parking lot and access to drive aisle to the back of the proposed school building. The stormwater runoff from this watershed is collected per a proposed catch basin discharged through existing stormwater conveyance system on site to POA-1.

PR-Watershed-21: This watershed consists of a portion of the access road to Tri Conty Regional Vocational High School that is asphalt. The stormwater runoff for this watershed is captured per a catch basin along the access road and released at the site (POA-1).

PR-Watershed-22: This watershed consists of the Southern west side of the proposed building development. Stormwater runoff is conveyed through roof leaders and underground piping to BMP #3 and then to the existing stormwater conveyance system to POA-3.

Analysis:
The analysis was based on the pre and post development peak discharge rates at the points of analysis. The proposed construction of the Tri-County High School will result in a slight increase in impervious area, therefore the proposed stormwater management system will be designed to mitigate any increase in the rate of runoff and improve stormwater quality.

Results/ Summary

Results of Analysis:
Through the use of the HydroCAD Software, the curve numbers, times of concentrations, and peak discharge rates were determined for both the existing conditions and the proposed conditions. The results of the study shows that both the post-development peak rates of runoff are equal or less than the existing rates.

As shown in Tables below the post development peak rates of runoff from the site will be mitigated.

Existing	Area (ac)	% Imp	Imp (Ac)
POA-1	6.5	54.4	3.6
POA-2	9.0	55.6	5.0
POA-3	32.5	42.4	13.8
POA-4	3.3	2.3	0.1
POA-5	5.0	0.0	0.0
POA-6	2.1	0.0	0.0
POA-7	1.6	47.3	0.7
POA-8	1.1	0.0	0.0
POA	0.2	0.0	0.0
Total	45.8		14.6

Proposed	Area (ac)	% Imp	Imp (Ac)
POA-1	11.3	61.7	6.9
POA-2	12.3	49.6	6.1
POA-3	38.6	40.4	15.6
POA-4	0.2	0.0	0.0
POA-5	1.9	0.0	0.0
POA-6	2.0	0.0	0.0
POA-7	2.0	63.3	1.3
POA-8	0.9	0.0	0.0
POA-9	0.1	0.0	0.0
Total	45.8		16.9

Existing Q	2-year	10-year	25-year	100-year
POA-1	14.68	25.66	32.62	43.37
POA-2	17.95	31.93	40.77	54.41
POA-3	55.15	96.97	120.6	152.93
POA-4	3.31	7.77	10.81	15.64
POA-5	2.92	8.63	12.12	17.73
POA-6	3.05	6.38	8.56	11.95
POA-7	2.93	5.56	9.5	27.14
POA-8	0.83	2.1	2.98	4.41
POA-9	0.15	0.39	0.56	0.84

Existing V	2-year	10-year	25-year	100-year
POA-1	1.146	2.061	2.656	3.59
POA-2	1.585	2.86	3.69	4.98
POA-3	5.011	9.462	12.365	16.741
POA-4	0.314	0.70	0.971	1.409
POA-5	0.353	0.921	1.319	1.967
POA-6	0.254	0.522	0.702	0.99
POA-7	0.239	0.458	0.621	1.078
POA-8	0.091	0.215	0.302	0.445
POA-9	0.014	0.033	0.047	0.07

Proposed Q	2-year	10-year	25-year	100-year
POA-1	11.68	19.46	24.65	34.71
POA-2	4.46	13.2	18.1	24.81
POA-3	40.62	81.61	105.73	141.78
POA-4	0.22	0.55	0.78	1.14
POA-5	2.86	8.06	10.59	14.55
POA-6	2.81	5.99	8.1	11.38
POA-7	4.36	7.76	9.88	20.09
POA-8	0.71	1.85	2.66	3.96
POA-9	0.12	0.31	0.45	0.67

Proposed V	2-year	10-year	25-year	100-year
POA-1	2.06	3.572	4.554	6.095
POA-2	0.78	1.636	2.203	3.10
POA-3	5.574	10.705	14.077	19.112
POA-4	0.02	0.045	0.063	0.093
POA-5	0.331	0.763	1.051	1.51
POA-6	0.235	0.491	0.664	0.941
POA-7	0.357	0.648	0.85	1.461
POA-8	0.07	0.168	0.237	0.352
POA-9	0.011	0.026	0.037	0.056

Peak WSE	2-year	10-year	25-year	100-year	Qin-25	Qout-25	Qin-100	Qout-100	BMP	Product	Quantities (chambers)	Total Available Storage (cf)	Invert	Crown	Bedrock	GW El	Outlet	Boring	Geotech 03/15/24	GW El	Bottom of TP El
BMP-1	372.69	373.48	374.01	374.87	24.06	8.48	31.13	10.21	Detention	4' StormTrap	7 x 14	32781	371.33	375.33	372.5		21" @ 0.5%	B-6	TP-106	381.5	373
BMP-2	373.46	374.41	374.8	375.6	19.1	12.67	24.5	14.78	Detention	4' StormTrap	6 x 7*	14049	371.83	375.83	370		18" @ 1.5%	B-8	TP-110	378.5	376.5
BMP-3	358.61	359.43	360.02	361.06	17.84	6.73	23.27	8.74	Infiltration	MC-3500	8 x 23*	32819	357.25	361.00	355.5	N/A	15" @ 1%	TC-114			
BMP-4	339.41	340.03	340.3	341.13	24.54	23.21	32.54	27.8	Infiltration	MC-3500	8 x 20	22539	336.75	340.50	N/A	330.5	24" @ 1%**	TP-102			

Stormwater Management Standards

The Department of Environmental Protection has implemented the Stormwater Management Standards as of November 18, 1996 and updated them in April 2008. The standards met are described below and in the Stormwater Management Form as provided by DEP.

Standard #1: Untreated Stormwater

The project is designed so that stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands or waters.

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed project will result in a slight increase in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site. See Tables above.

Therefore Standard #2 is met.

Standard #3: Recharge to groundwater

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best

management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Soil types have been identified based on the information contained in the Soil Report. We have determined that the soils are consistent with Hydrologic soil type "C", and "D" which requires runoff to be infiltrated (as listed in the table below) from new impervious areas.

The proposed development will result in an increase in impervious area in the "A", "C" and "D" soil areas. To be conservative, the calculations for required recharge volumes are based on the required inches of runoff for the new impervious area per soil area.

Hydrologic Group Volume to Recharge (x Total Impervious Area)	
Hydrologic Group	Volume to Recharge x Total Impervious Area
A	0.60 inches of runoff
B	0.35 inches of runoff
C	0.25 inches of runoff
D	0.10 inches of runoff

Required Recharge Volumes:
"A" Soils

Infiltration Rate: 0.60 inches of runoff
Proposed Site New Impervious Area in "A" Soils: 3,877 sf
3,877 sf x 0.60 x (1/12) = 194 cf

"C/D" Soils

Infiltration Rate: 0.17 inches of runoff
Proposed Site New Impervious Area in "C" Soils: 647,824 sf
647,824 sf x 0.17 x (1/12) = 9177 cf

"D" Soils

Infiltration Rate: 0.10 inches of runoff
Proposed Site New Impervious Area in "D" Soils: 51,270 sf
51,270 sf x 0.10 x (1/12) = 427 cf

Total required recharge volume: 9,798 cf

647,824 sf x 0.17 x (1/12) = 9,177 cf
3,877 sf x 0.60 x (1/12) = 194 cf
51,270 sf x 0.10 x (1/12) = 427 cf
702,971 sf – 253,250 sf = 449,721 sf (Site area draining to recharge facilities)
702,971 sf / 449721 sf = 1.56 ratio

1.56(9,798 cf) = 15,285 cf

Total adjusted recharge volume: 15,285 cf

Proposed Recharge Volume:

BMP #3 = 9,428 cf
BMP #4 = 10,056 cf
Total provided recharge volume: 19,484 cf

Drawdown Time (Assuming "C/D" soils):

BMP-3 (maximum time 72 hours)= 9428 cf / (0.17 in/hr x 9995 sf / 12 in/ft) = 66.58 hours

Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: Area Drains, Catch Basins, Outlet Control Structures, Water Quality Units, and Subsurface Structures.

- PR-Watershed-10,11,12,13,16,18,19:
  Initial TSS=1.00
  Total TSS Removal= 0%

- PR-Watershed-3,4,6,9:
  Initial TSS=1.00
  Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
  (Pre-Treatment TSS Removal) = 25%

  Water Quality Unit:(1.00)(1.00-0.80)=0.20
  Infiltration System: (0.20)(1.00-0.80)=0.04
  TSS Removal= 96%

- PR-Watershed-1,2,14,15,17,20:
  Initial TSS=1.00
  Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
  (Pre-Treatment TSS Removal) = 25%

  Water Quality Unit:(1.00)(1.00-0.80)=0.2
  Total TSS Removal= 80%

- PR-Watershed-5,7,8,21:
  Initial TSS=1.00
  Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
  Total TSS Removal= 25%

Water Quality Volume:

The stormwater management system has been sized to treat for the 1.0" runoff rate applied to the total impervious area for the water quality volume, as shown in the calculations provided below calculations for the infiltration stormwater BMPs, which all receive the minimum 25% pretreatment, are shown below. Roof runoff is considered "clean" and has therefore been excluded from this calculation. Where site topography and groundwater elevation precluded the use of infiltration BMPs, proprietary water quality units are proposed which are specifically designed to address water quality prior to discharge.

Impervious area for watershed areas of re development requiring water quality treatment= 527,516 sf

527,516 sf x 1.0" x (1'/12") = 44,000 cf

Total Water Quality Volume Required = 44,000 cf

BMP #3 = 9,428 cf
BMP #4 = 10,056 cf

BETA Response Letter 06/13/24 SW58: "The required water quality volume will be provided via the water quality flow rate for which calculations have been provided."

Phosphorus Removal Structure (High-Rate Stormwater Filtration Device)
D3-04-WQU = 1.081 cfs
D1-30-WQU = 2.580 cfs
C1-16-WQU = 2.415 cfs
A1-06-WQU =1.666 cfs
B1-09-WQU = 0.948 cfs

Hydrodynamic Separators
E-08-WQU = 0.326 cfs
B3-11-DMH (rebuilt WQU) = 0.519 cfs

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

The project site does not contain Land Uses with Higher Potential Pollutant Loads.

Therefore Standard #5 is met.

Standard #6: Protection of critical areas

The site is not located within a critical area.

Therefore Standard #6 is met.

Standard #7: Redevelopment projects

The project is considered Redevelopment and New Construction, and all of the Standards will be met.

Therefore Standard #7 is met.

Standard #8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

Soil Erosion and Sediment Control Plan:
The objectives of the Soil Erosion and Sediment Control Plan are to control erosion at its source with temporary control structures, minimize the runoff from areas of disturbance, and de-concentrate and distribute stormwater runoff through natural vegetation before discharge to critical zones such as streams or wetlands. Soil erosion control does not begin with the perimeter sediment trap. It begins at the source of the sediment, the disturbed land areas, and extends down to the control structure.

The Soil Erosion and Sediment Control Plan will be enacted in order to protect the resource areas during construction. The erosion control devices will remain in place until all exposed areas have been stabilized with vegetation or impervious surfaces.

The objective of the Soil Erosion & Sediment Control Plan that will be enacted on site is to control the vulnerability of the soil to the erosion process or the capability of moving water to detach soil particles during the construction phase(s).

The erosion and sediment control plan to be in place during the construction phase is detailed within the NOI narrative (under separate cover).

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

An operation and maintenance plan for both construction and post-development stormwater controls has been developed. The plan includes owner(s); parties responsible for operation and maintenance; schedule for inspection and maintenance; routine and non-routine maintenance tasks. A copy of the O&M is included in the Appendix.

Therefore Standard #9 is met.

Standard #10: All illicit discharges to the stormwater management system are prohibited.

It is not anticipated that there will be any Illicit discharges for the project.

Therefore Standard #10 is met.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

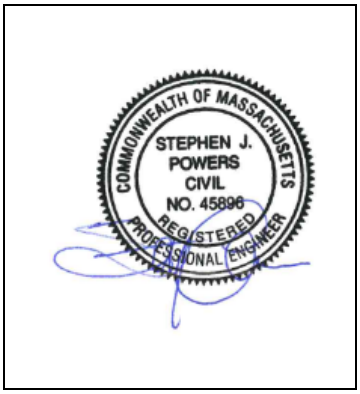
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



03/20/2024
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☐ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

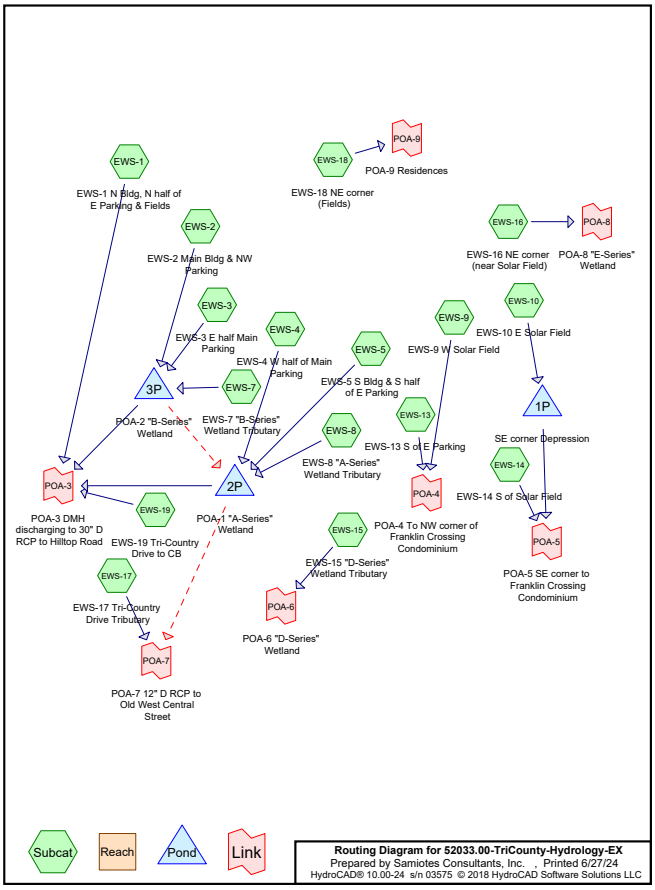
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

TABLE OF APPENDICES

APPENDIX 1:
EXISTING HYDROLOGICAL CALCULATIONS



Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
19.289	74	>75% Grass cover, Good, HSG C (EWS-1, EWS-10, EWS-14, EWS-16, EWS-2, EWS-3, EWS-4, EWS-5, EWS-8, EWS-9)
0.440	87	Dirt roads, HSG C (EWS-1, EWS-2)
0.153	96	Gravel surface, HSG C (EWS-8, EWS-9)
0.255	96	Gravel surface, HSG D (EWS-15)
11.142	98	Paved parking & bldg, HSG C (EWS-1, EWS-13, EWS-19, EWS-2, EWS-5)
0.089	98	Paved parking, HSG A (EWS-17)
2.711	98	Paved parking, HSG C (EWS-3, EWS-4)
0.657	98	Paved parking, HSG D (EWS-17)
0.099	30	Woods, Good, HSG A (EWS-17)
8.415	70	Woods, Good, HSG C (EWS-1, EWS-10, EWS-13, EWS-14, EWS-16, EWS-18, EWS-7, EWS-8, EWS-9)
2.565	77	Woods, Good, HSG D (EWS-15, EWS-17)
45.816	**81**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.188	HSG A	EWS-17
0.000	HSG B	
42.151	HSG C	EWS-1, EWS-10, EWS-13, EWS-14, EWS-16, EWS-18, EWS-19, EWS-2, EWS-3, EWS-4, EWS-5, EWS-7, EWS-8, EWS-9
3.477	HSG D	EWS-15, EWS-17
0.000	Other	
45.816		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	19.289	0.000	0.000	19.289	>75% Grass cover, Good	EWS-1, EWS-10, EWS-14, EWS-16, EWS-2, EWS-3, EWS-4, EWS-5, EWS-8, EWS-9
0.000	0.000	0.440	0.000	0.000	0.440	Dirt roads	EWS-1, EWS-2
0.000	0.000	0.153	0.255	0.000	0.408	Gravel surface	EWS-15, EWS-8, EWS-9
0.089	0.000	2.711	0.657	0.000	3.456	Paved parking	EWS-17, EWS-3, EWS-4
0.000	0.000	11.142	0.000	0.000	11.142	Paved parking & bldg	EWS-1, EWS-13, EWS-19, EWS-2, EWS-5
0.099	0.000	8.415	2.565	0.000	11.079	Woods, Good	EWS-1, EWS-10, EWS-13, EWS-14, EWS-15, EWS-16, EWS-17, EWS-18, EWS-7, EWS-8, EWS-9

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.188	**0.000**	**42.151**	**3.477**	**0.000**	**45.816**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	EWS-1	0.00	0.00	287.0	0.0110	0.011	18.0	0.0	0.0
2	EWS-1	0.00	0.00	232.0	0.0330	0.011	30.0	0.0	0.0
3	EWS-1	0.00	0.00	133.0	0.0100	0.011	30.0	0.0	0.0
4	EWS-1	0.00	0.00	780.0	0.0300	0.011	36.0	0.0	0.0
5	EWS-2	0.00	0.00	190.0	0.0180	0.011	18.0	0.0	0.0
6	EWS-2	0.00	0.00	145.0	0.0110	0.011	24.0	0.0	0.0
7	EWS-3	0.00	0.00	56.0	0.0196	0.011	12.0	0.0	0.0
8	EWS-3	0.00	0.00	55.0	0.0100	0.011	24.0	0.0	0.0
9	2P	302.70	298.60	89.0	0.0461	0.011	18.0	0.0	0.0
10	3P	311.10	303.80	136.0	0.0537	0.011	30.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWS-1: EWS-1 N Bldg, N Runoff Area=727,994 sf 29.62% Impervious Runoff Depth=1.60"
Flow Length=1,790' Tc=12.8 min CN=81 Runoff=24.93 cfs 2.223 af

SubcatchmentEWS-10: EWS-10 E Solar Runoff Area=173,887 sf 0.00% Impervious Runoff Depth=1.09"
Flow Length=852' Tc=24.2 min CN=73 Runoff=2.98 cfs 0.361 af

SubcatchmentEWS-13: EWS-13 S of E Runoff Area=33,059 sf 10.17% Impervious Runoff Depth=1.09"
Flow Length=261' Tc=13.5 min CN=73 Runoff=0.72 cfs 0.069 af

SubcatchmentEWS-14: EWS-14 S of Solar Runoff Area=43,733 sf 0.00% Impervious Runoff Depth=0.98"
Flow Length=213' Tc=14.2 min CN=71 Runoff=0.81 cfs 0.082 af

SubcatchmentEWS-15: EWS-15 "D-Series" Runoff Area=90,898 sf 0.00% Impervious Runoff Depth=1.46"
Flow Length=376' Tc=10.2 min CN=79 Runoff=3.05 cfs 0.254 af

SubcatchmentEWS-16: EWS-16 NE corner Runoff Area=48,959 sf 0.00% Impervious Runoff Depth=0.98"
Flow Length=252' Tc=18.0 min CN=71 Runoff=0.83 cfs 0.091 af

SubcatchmentEWS-17: EWS-17 Runoff Area=68,732 sf 47.27% Impervious Runoff Depth=1.82"
Flow Length=283' Tc=10.1 min CN=84 Runoff=2.93 cfs 0.239 af

SubcatchmentEWS-18: EWS-18 NE corner Runoff Area=7,902 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.15 cfs 0.014 af

SubcatchmentEWS-19: EWS-19 Runoff Area=11,472 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=0.86 cfs 0.069 af

SubcatchmentEWS-2: EWS-2 Main Bldg Runoff Area=233,176 sf 68.92% Impervious Runoff Depth=2.41"
Flow Length=648' Tc=11.7 min CN=91 Runoff=12.34 cfs 1.075 af

SubcatchmentEWS-3: EWS-3 E half Main Runoff Area=85,697 sf 67.06% Impervious Runoff Depth=2.32"
Flow Length=486' Tc=6.4 min CN=90 Runoff=5.20 cfs 0.380 af

SubcatchmentEWS-4: EWS-4 W half of Runoff Area=77,068 sf 78.63% Impervious Runoff Depth=2.60"
Tc=6.0 min CN=93 Runoff=5.20 cfs 0.383 af

SubcatchmentEWS-5: EWS-5 S Bldg & S Runoff Area=125,750 sf 74.92% Impervious Runoff Depth=2.50"
Tc=6.0 min CN=92 Runoff=8.25 cfs 0.602 af

SubcatchmentEWS-7: EWS-7 "B-Series" Runoff Area=73,809 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=221' Tc=11.7 min CN=70 Runoff=1.37 cfs 0.130 af

SubcatchmentEWS-8: EWS-8 "A-Series" Runoff Area=81,652 sf 0.00% Impervious Runoff Depth=1.03"
Flow Length=269' Tc=12.0 min CN=72 Runoff=1.73 cfs 0.161 af

SubcatchmentEWS-9: EWS-9 W Solar Runoff Area=111,937 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=547' Tc=13.3 min CN=74 Runoff=2.59 cfs 0.245 af

Pond 1P: SE corner Depression Peak Elev=377.32' Storage=4,205 cf Inflow=2.98 cfs 0.361 af
Outflow=2.49 cfs 0.272 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=305.59' Storage=1,429 cf Inflow=14.68 cfs 1.146 af
Primary=12.46 cfs 1.146 af Secondary=0.00 cfs 0.000 af Outflow=12.46 cfs 1.146 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=312.91' Storage=1,631 cf Inflow=17.95 cfs 1.585 af
Primary=17.44 cfs 1.574 af Secondary=0.00 cfs 0.000 af Outflow=17.44 cfs 1.574 af

Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road Inflow=55.15 cfs 5.011 af
Primary=55.15 cfs 5.011 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=3.31 cfs 0.314 af
Primary=3.31 cfs 0.314 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=2.92 cfs 0.353 af
Primary=2.92 cfs 0.353 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=3.05 cfs 0.254 af
Primary=3.05 cfs 0.254 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=2.93 cfs 0.239 af
Primary=2.93 cfs 0.239 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=0.83 cfs 0.091 af
Primary=0.83 cfs 0.091 af

Link POA-9: POA-9 Residences Inflow=0.15 cfs 0.014 af
Primary=0.15 cfs 0.014 af

Total Runoff Area = 45.816 ac Runoff Volume = 6.377 af Average Runoff Depth = 1.67"
68.14% Pervious = 31.217 ac 31.86% Impervious = 14.599 ac

Summary for Subcatchment EWS-1: EWS-1 N Bldg, N half of E Parking & Fields

Runoff = 24.93 cfs @ 12.18 hrs, Volume= 2.223 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	215,603	98	Paved parking & bldg, HSG C
	413,613	74	>75% Grass cover, Good, HSG C
	84,772	70	Woods, Good, HSG C
	14,006	87	Dirt roads, HSG C
	727,994	81	Weighted Average
	512,391		70.38% Pervious Area
	215,603		29.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	244	0.0150	0.86		**Shallow Concentrated Flow, SCF 244 FT** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.4687	4.79		**Shallow Concentrated Flow, SCF 32 FT** Short Grass Pasture Kv= 7.0 fps
0.4	32	0.0050	1.44		**Shallow Concentrated Flow, SCF 32 FT** Paved Kv= 20.3 fps
0.6	287	0.0110	7.37	13.02	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.2	232	0.0330	17.94	88.06	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
0.2	133	0.0100	9.88	48.47	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
12.8	1,790	Total			

Summary for Subcatchment EWS-10: EWS-10 E Solar Field

Runoff = 2.98 cfs @ 12.37 hrs, Volume= 0.361 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
42,967	74	>75% Grass cover, Good, HSG C
105,590	74	>75% Grass cover, Good, HSG C
25,330	70	Woods, Good, HSG C
173,887	73	Weighted Average
173,887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET FLOW 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.3	281	0.0240	1.08		**Shallow Concentrated Flow, SCF 281 FT** Short Grass Pasture Kv= 7.0 fps
13.1	440	0.0125	0.56		**Shallow Concentrated Flow, SCF 440 FT WOODS** Woodland Kv= 5.0 fps
1.2	81	0.0270	1.15		**Shallow Concentrated Flow, SCF 81 FT** Short Grass Pasture Kv= 7.0 fps
24.2	852	Total			

Summary for Subcatchment EWS-13: EWS-13 S of E Parking

Runoff = 0.72 cfs @ 12.20 hrs, Volume= 0.069 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	3,362	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	29,697	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	33,059	73	Weighted Average
	29,697		89.83% Pervious Area
	3,362		10.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.0	211	0.0560	1.18		**Shallow Concentrated Flow, SCF 211 FT WOODS** Woodland Kv= 5.0 fps
13.5	261	Total			

Summary for Subcatchment EWS-14: EWS-14 S of Solar Field

Runoff = 0.81 cfs @ 12.21 hrs, Volume= 0.082 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	10,165	74	>75% Grass cover, Good, HSG C
	33,568	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	43,733	71	Weighted Average
	43,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	163	0.0210	0.72		**Shallow Concentrated Flow, SCF 163 FT WOODS** Woodland Kv= 5.0 fps
14.2	213	Total			

Summary for Subcatchment EWS-15: EWS-15 "D-Series" Wetland Tributary

Runoff = 3.05 cfs @ 12.15 hrs, Volume= 0.254 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
79,801	77	Woods, Good, HSG D
11,097	96	Gravel surface, HSG D
90,898	79	Weighted Average
90,898		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment EWS-16: EWS-16 NE corner (near Solar Field)

Runoff = 0.83 cfs @ 12.27 hrs, Volume= 0.091 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	6,639	74	>75% Grass cover, Good, HSG C
	42,320	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	48,959	71	Weighted Average
	48,959		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	50	0.0140	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	202	0.0310	0.88		**Shallow Concentrated Flow, SCF 202 FT WOODS** Woodland Kv= 5.0 fps
18.0	252	Total			

Summary for Subcatchment EWS-17: EWS-17 Tri-Country Drive Tributary

Runoff = 2.93 cfs @ 12.14 hrs, Volume= 0.239 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
28,611	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
31,929	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
68,732	84	Weighted Average
36,243		52.73% Pervious Area
32,489		47.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-TWO PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment EWS-18: EWS-18 NE corner (Fields)

Runoff = 0.15 cfs @ 12.17 hrs, Volume= 0.014 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	7,902	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	7,902	70	Weighted Average
	7,902		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment EWS-19: EWS-19 Tri-Country Drive to CB

Runoff = 0.86 cfs @ 12.08 hrs, Volume= 0.069 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	11,472	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	11,472	98	Weighted Average
	11,472		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-2: EWS-2 Main Bldg & NW Parking

Runoff = 12.34 cfs @ 12.16 hrs, Volume= 1.075 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	160,713	98	Paved parking & bldg, HSG C
	67,283	74	>75% Grass cover, Good, HSG C
	5,180	87	Dirt roads, HSG C
	233,176	91	Weighted Average
	72,463		31.08% Pervious Area
	160,713		68.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0134	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
2.7	130	0.0134	0.81		**Shallow Concentrated Flow, SCF 130 FT** Short Grass Pasture Kv= 7.0 fps
1.8	133	0.0324	1.26		**Shallow Concentrated Flow, SCF 133 FT** Short Grass Pasture Kv= 7.0 fps
0.3	190	0.0180	9.43	16.66	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.3	145	0.0110	8.93	28.04	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
11.7	648	Total			

Summary for Subcatchment EWS-3: EWS-3 E half Main Parking

Runoff = 5.20 cfs @ 12.09 hrs, Volume= 0.380 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
57,471	98	Paved parking, HSG C
28,226	74	>75% Grass cover, Good, HSG C
85,697	90	Weighted Average
28,226		32.94% Pervious Area
57,471		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0360	0.19		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	325	0.0230	3.08		**Shallow Concentrated Flow, SCF 325 FT** Paved Kv= 20.3 fps
0.1	56	0.0196	7.51	5.89	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.1	55	0.0100	8.51	26.74	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
6.4	486	Total			

Summary for Subcatchment EWS-4: EWS-4 W half of Main Parking

Runoff = 5.20 cfs @ 12.09 hrs, Volume= 0.383 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
60,601	98	Paved parking, HSG C
16,467	74	>75% Grass cover, Good, HSG C
77,068	93	Weighted Average
16,467		21.37% Pervious Area
60,601		78.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-5: EWS-5 S Bldg & S half of E Parking

Runoff = 8.25 cfs @ 12.09 hrs, Volume= 0.602 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	94,210	98	Paved parking & bldg, HSG C
	31,540	74	>75% Grass cover, Good, HSG C
	125,750	92	Weighted Average
	31,540		25.08% Pervious Area
	94,210		74.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-7: EWS-7 "B-Series" Wetland Tributary

Runoff = 1.37 cfs @ 12.18 hrs, Volume= 0.130 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
	73,809	70	Woods, Good, HSG C
	73,809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	13	0.0460	0.07		**Sheet Flow, SHEET 13 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
7.1	87	0.2370	0.20		**Sheet Flow, SHEET 87 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	121	0.0660	1.28		**Shallow Concentrated Flow, SCF 121 FT** Woodland Kv= 5.0 fps
11.7	221	Total			

Summary for Subcatchment EWS-8: EWS-8 "A-Series" Wetland Tributary

Runoff = 1.73 cfs @ 12.18 hrs, Volume= 0.161 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
	6,940	74	>75% Grass cover, Good, HSG C
	68,992	70	Woods, Good, HSG C
	5,720	96	Gravel surface, HSG C
	81,652	72	Weighted Average
	81,652		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1230	0.16		**Sheet Flow, SHEET 100 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	169	0.1240	1.76		**Shallow Concentrated Flow, SCF 169 FT** Woodland Kv= 5.0 fps
12.0	269	Total			

Summary for Subcatchment EWS-9: EWS-9 W Solar Field

Runoff = 2.59 cfs @ 12.19 hrs, Volume= 0.245 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
	31,792	74	>75% Grass cover, Good, HSG C
	79,016	74	>75% Grass cover, Good, HSG C
	170	70	Woods, Good, HSG C
	959	96	Gravel surface, HSG C
	111,937	74	Weighted Average
	111,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0280	0.17		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
8.4	497	0.0200	0.99		**Shallow Concentrated Flow, SCF 497 FT** Short Grass Pasture Kv= 7.0 fps
13.3	547	Total			

Summary for Pond 1P: SE corner Depression

Inflow Area = 3.992 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-year event
Inflow = 2.98 cfs @ 12.37 hrs, Volume= 0.361 af
Outflow = 2.49 cfs @ 12.53 hrs, Volume= 0.272 af, Atten= 17%, Lag= 10.1 min
Primary = 2.49 cfs @ 12.53 hrs, Volume= 0.272 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.32' @ 12.53 hrs Surf.Area= 4,145 sf Storage= 4,205 cf

Plug-Flow detention time= 145.8 min calculated for 0.272 af (75% of inflow)
Center-of-Mass det. time= 52.1 min (931.2 - 879.1)

Volume	Invert	Avail.Storage	Storage Description
#1	376.00'	7,495 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.00	2,443	204.0	0	0	2,443
377.00	3,528	247.0	2,969	2,969	4,003
378.00	5,603	325.0	4,526	7,495	7,565

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.47 cfs @ 12.53 hrs HW=377.32' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.47 cfs @ 0.68 fps)

Stage-Area-Storage for Pond 1P: SE corner Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.00	2,443	0	377.04	3,602	3,112
376.02	2,463	49	377.06	3,639	3,184
376.04	2,483	99	377.08	3,676	3,257
376.06	2,502	148	377.10	3,714	3,331
376.08	2,522	199	377.12	3,752	3,406
376.10	2,543	249	377.14	3,790	3,481
376.12	2,563	300	377.16	3,828	3,557
376.14	2,583	352	377.18	3,866	3,634
376.16	2,603	404	377.20	3,905	3,712
376.18	2,624	456	377.22	3,944	3,790
376.20	2,644	509	377.24	3,982	3,870
376.22	2,665	562	377.26	4,022	3,950
376.24	2,685	615	377.28	4,061	4,030
376.26	2,706	669	377.30	4,100	4,112
376.28	2,727	723	377.32	4,140	4,195
376.30	2,748	778	377.34	4,180	4,278
376.32	2,769	833	377.36	4,220	4,362
376.34	2,790	889	377.38	4,260	4,447
376.36	2,811	945	377.40	4,301	4,532
376.38	2,832	1,001	377.42	4,341	4,619
376.40	2,853	1,058	377.44	4,382	4,706
376.42	2,874	1,115	377.46	4,423	4,794
376.44	2,896	1,173	377.48	4,464	4,883
376.46	2,917	1,231	377.50	4,506	4,972
376.48	2,939	1,290	377.52	4,547	5,063
376.50	2,961	1,349	377.54	4,589	5,154
376.52	2,982	1,408	377.56	4,631	5,246
376.54	3,004	1,468	377.58	4,673	5,340
376.56	3,026	1,528	377.60	4,716	5,433
376.58	3,048	1,589	377.62	4,758	5,528
376.60	3,070	1,650	377.64	4,801	5,624
376.62	3,092	1,712	377.66	4,844	5,720
376.64	3,114	1,774	377.68	4,887	5,818
376.66	3,137	1,837	377.70	4,930	5,916
376.68	3,159	1,900	377.72	4,974	6,015
376.70	3,182	1,963	377.74	5,018	6,115
376.72	3,204	2,027	377.76	5,061	6,215
376.74	3,227	2,091	377.78	5,106	6,317
376.76	3,249	2,156	377.80	5,150	6,420
376.78	3,272	2,221	377.82	5,194	6,523
376.80	3,295	2,287	377.84	5,239	6,627
376.82	3,318	2,353	377.86	5,284	6,733
376.84	3,341	2,419	377.88	5,329	6,839
376.86	3,364	2,487	377.90	5,374	6,946
376.88	3,387	2,554	377.92	5,419	7,054
376.90	3,411	2,622	377.94	5,465	7,163
376.92	3,434	2,690	377.96	5,511	7,272
376.94	3,457	2,759	377.98	5,557	7,383
376.96	3,481	2,829	378.00	**5,603**	**7,495**
376.98	3,504	2,899			
377.00	3,528	2,969			
377.02	3,565	3,040			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 6.531 ac, 54.42% Impervious, Inflow Depth = 2.11" for 2-year event
Inflow = 14.68 cfs @ 12.09 hrs, Volume= 1.146 af
Outflow = 12.46 cfs @ 12.14 hrs, Volume= 1.146 af, Atten= 15%, Lag= 3.2 min
Primary = 12.46 cfs @ 12.14 hrs, Volume= 1.146 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 305.59' @ 12.14 hrs Surf.Area= 1,301 sf Storage= 1,429 cf

Plug-Flow detention time= 0.9 min calculated for 1.146 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (805.7 - 804.9)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=12.45 cfs @ 12.14 hrs HW=305.59' (Free Discharge)
↑**1=Culvert** (Inlet Controls 12.45 cfs @ 7.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.70' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 9.015 ac, 55.56% Impervious, Inflow Depth = 2.11" for 2-year event
Inflow = 17.95 cfs @ 12.14 hrs, Volume= 1.585 af
Outflow = 17.44 cfs @ 12.17 hrs, Volume= 1.574 af, Atten= 3%, Lag= 1.9 min
Primary = 17.44 cfs @ 12.17 hrs, Volume= 1.574 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 312.91' @ 12.17 hrs Surf.Area= 1,837 sf Storage= 1,631 cf

Plug-Flow detention time= 8.6 min calculated for 1.574 af (99% of inflow)
Center-of-Mass det. time= 4.2 min (815.9 - 811.7)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=17.43 cfs @ 12.17 hrs HW=312.91' (Free Discharge)
↑**1=Culvert** (Inlet Controls 17.43 cfs @ 4.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road

Inflow Area = 32.521 ac, 42.36% Impervious, Inflow Depth = 1.85" for 2-year event
Inflow = 55.15 cfs @ 12.17 hrs, Volume= 5.011 af
Primary = 55.15 cfs @ 12.17 hrs, Volume= 5.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 3.329 ac, 2.32% Impervious, Inflow Depth = 1.13" for 2-year event
Inflow = 3.31 cfs @ 12.19 hrs, Volume= 0.314 af
Primary = 3.31 cfs @ 12.19 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 4.996 ac, 0.00% Impervious, Inflow Depth = 0.85" for 2-year event
Inflow = 2.92 cfs @ 12.53 hrs, Volume= 0.353 af
Primary = 2.92 cfs @ 12.53 hrs, Volume= 0.353 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.087 ac, 0.00% Impervious, Inflow Depth = 1.46" for 2-year event
Inflow = 3.05 cfs @ 12.15 hrs, Volume= 0.254 af
Primary = 3.05 cfs @ 12.15 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 1.578 ac, 47.27% Impervious, Inflow Depth = 1.82" for 2-year event
Inflow = 2.93 cfs @ 12.14 hrs, Volume= 0.239 af
Primary = 2.93 cfs @ 12.14 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 1.124 ac, 0.00% Impervious, Inflow Depth = 0.98" for 2-year event
Inflow = 0.83 cfs @ 12.27 hrs, Volume= 0.091 af
Primary = 0.83 cfs @ 12.27 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.181 ac, 0.00% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.15 cfs @ 12.17 hrs, Volume= 0.014 af
Primary = 0.15 cfs @ 12.17 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWS-1: EWS-1 N Bldg, N Runoff Area=727,994 sf 29.62% Impervious Runoff Depth=3.19"
Flow Length=1,790' Tc=12.8 min CN=81 Runoff=50.10 cfs 4.442 af

SubcatchmentEWS-10: EWS-10 E Solar Runoff Area=173,887 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=852' Tc=24.2 min CN=73 Runoff=7.12 cfs 0.819 af

SubcatchmentEWS-13: EWS-13 S of E Runoff Area=33,059 sf 10.17% Impervious Runoff Depth=2.46"
Flow Length=261' Tc=13.5 min CN=73 Runoff=1.71 cfs 0.156 af

SubcatchmentEWS-14: EWS-14 S of Solar Runoff Area=43,733 sf 0.00% Impervious Runoff Depth=2.29"
Flow Length=213' Tc=14.2 min CN=71 Runoff=2.06 cfs 0.192 af

SubcatchmentEWS-15: EWS-15 "D-Series" Runoff Area=90,898 sf 0.00% Impervious Runoff Depth=3.00"
Flow Length=376' Tc=10.2 min CN=79 Runoff=6.38 cfs 0.522 af

SubcatchmentEWS-16: EWS-16 NE corner Runoff Area=48,959 sf 0.00% Impervious Runoff Depth=2.29"
Flow Length=252' Tc=18.0 min CN=71 Runoff=2.10 cfs 0.215 af

SubcatchmentEWS-17: EWS-17 Runoff Area=68,732 sf 47.27% Impervious Runoff Depth=3.48"
Flow Length=283' Tc=10.1 min CN=84 Runoff=5.56 cfs 0.458 af

SubcatchmentEWS-18: EWS-18 NE corner Runoff Area=7,902 sf 0.00% Impervious Runoff Depth=2.21"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.39 cfs 0.033 af

SubcatchmentEWS-19: EWS-19 Runoff Area=11,472 sf 100.00% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=98 Runoff=1.35 cfs 0.110 af

SubcatchmentEWS-2: EWS-2 Main Bldg Runoff Area=233,176 sf 68.92% Impervious Runoff Depth=4.21"
Flow Length=648' Tc=11.7 min CN=91 Runoff=20.99 cfs 1.876 af

SubcatchmentEWS-3: EWS-3 E half Main Runoff Area=85,697 sf 67.06% Impervious Runoff Depth=4.10"
Flow Length=486' Tc=6.4 min CN=90 Runoff=8.97 cfs 0.672 af

SubcatchmentEWS-4: EWS-4 W half of Runoff Area=77,068 sf 78.63% Impervious Runoff Depth=4.42"
Tc=6.0 min CN=93 Runoff=8.60 cfs 0.652 af

SubcatchmentEWS-5: EWS-5 S Bldg & S Runoff Area=125,750 sf 74.92% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=92 Runoff=13.82 cfs 1.038 af

SubcatchmentEWS-7: EWS-7 "B-Series" Runoff Area=73,809 sf 0.00% Impervious Runoff Depth=2.21"
Flow Length=221' Tc=11.7 min CN=70 Runoff=3.57 cfs 0.312 af

SubcatchmentEWS-8: EWS-8 "A-Series" Runoff Area=81,652 sf 0.00% Impervious Runoff Depth=2.38"
Flow Length=269' Tc=12.0 min CN=72 Runoff=4.25 cfs 0.371 af

SubcatchmentEWS-9: EWS-9 W Solar Runoff Area=111,937 sf 0.00% Impervious Runoff Depth=2.55"
Flow Length=547' Tc=13.3 min CN=74 Runoff=6.06 cfs 0.546 af

Pond 1P: SE corner Depression Peak Elev=377.40' Storage=4,515 cf Inflow=7.12 cfs 0.819 af
Outflow=7.09 cfs 0.729 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=307.75' Storage=5,464 cf Inflow=25.66 cfs 2.061 af
Primary=17.64 cfs 2.061 af Secondary=0.00 cfs 0.000 af Outflow=17.64 cfs 2.061 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=313.81' Storage=4,168 cf Inflow=31.93 cfs 2.860 af
Primary=28.58 cfs 2.849 af Secondary=0.00 cfs 0.000 af Outflow=28.58 cfs 2.849 af

Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road Inflow=96.97 cfs 9.462 af
Primary=96.97 cfs 9.462 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=7.77 cfs 0.702 af
Primary=7.77 cfs 0.702 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=8.63 cfs 0.921 af
Primary=8.63 cfs 0.921 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=6.38 cfs 0.522 af
Primary=6.38 cfs 0.522 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=5.56 cfs 0.458 af
Primary=5.56 cfs 0.458 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=2.10 cfs 0.215 af
Primary=2.10 cfs 0.215 af

Link POA-9: POA-9 Residences Inflow=0.39 cfs 0.033 af
Primary=0.39 cfs 0.033 af

Total Runoff Area = 45.816 ac Runoff Volume = 12.413 af Average Runoff Depth = 3.25"
68.14% Pervious = 31.217 ac 31.86% Impervious = 14.599 ac

Summary for Subcatchment EWS-1: EWS-1 N Bldg, N half of E Parking & Fields

Runoff = 50.10 cfs @ 12.18 hrs, Volume= 4.442 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	215,603	98	Paved parking & bldg, HSG C
	413,613	74	>75% Grass cover, Good, HSG C
	84,772	70	Woods, Good, HSG C
	14,006	87	Dirt roads, HSG C
	727,994	81	Weighted Average
	512,391		70.38% Pervious Area
	215,603		29.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	244	0.0150	0.86		**Shallow Concentrated Flow, SCF 244 FT** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.4687	4.79		**Shallow Concentrated Flow, SCF 32 FT** Short Grass Pasture Kv= 7.0 fps
0.4	32	0.0050	1.44		**Shallow Concentrated Flow, SCF 32 FT** Paved Kv= 20.3 fps
0.6	287	0.0110	7.37	13.02	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.2	232	0.0330	17.94	88.06	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
0.2	133	0.0100	9.88	48.47	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
12.8	1,790	Total			

Summary for Subcatchment EWS-10: EWS-10 E Solar Field

Runoff = 7.12 cfs @ 12.34 hrs, Volume= 0.819 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
42,967	74	>75% Grass cover, Good, HSG C
105,590	74	>75% Grass cover, Good, HSG C
25,330	70	Woods, Good, HSG C
173,887	73	Weighted Average
173,887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET FLOW 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.3	281	0.0240	1.08		**Shallow Concentrated Flow, SCF 281 FT** Short Grass Pasture Kv= 7.0 fps
13.1	440	0.0125	0.56		**Shallow Concentrated Flow, SCF 440 FT WOODS** Woodland Kv= 5.0 fps
1.2	81	0.0270	1.15		**Shallow Concentrated Flow, SCF 81 FT** Short Grass Pasture Kv= 7.0 fps
24.2	852	Total			

Summary for Subcatchment EWS-13: EWS-13 S of E Parking

Runoff = 1.71 cfs @ 12.19 hrs, Volume= 0.156 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	3,362	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	29,697	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	33,059	73	Weighted Average
	29,697		89.83% Pervious Area
	3,362		10.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.0	211	0.0560	1.18		**Shallow Concentrated Flow, SCF 211 FT WOODS** Woodland Kv= 5.0 fps
13.5	261	Total			

Summary for Subcatchment EWS-14: EWS-14 S of Solar Field

Runoff = 2.06 cfs @ 12.20 hrs, Volume= 0.192 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	10,165	74	>75% Grass cover, Good, HSG C
	33,568	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	43,733	71	Weighted Average
	43,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	163	0.0210	0.72		**Shallow Concentrated Flow, SCF 163 FT WOODS** Woodland Kv= 5.0 fps
14.2	213	Total			

Summary for Subcatchment EWS-15: EWS-15 "D-Series" Wetland Tributary

Runoff = 6.38 cfs @ 12.14 hrs, Volume= 0.522 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
79,801	77	Woods, Good, HSG D
11,097	96	Gravel surface, HSG D
90,898	79	Weighted Average
90,898		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment EWS-16: EWS-16 NE corner (near Solar Field)

Runoff = 2.10 cfs @ 12.26 hrs, Volume= 0.215 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	6,639	74	>75% Grass cover, Good, HSG C
	42,320	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	48,959	71	Weighted Average
	48,959		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	50	0.0140	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	202	0.0310	0.88		**Shallow Concentrated Flow, SCF 202 FT WOODS** Woodland Kv= 5.0 fps
18.0	252	Total			

Summary for Subcatchment EWS-17: EWS-17 Tri-Country Drive Tributary

Runoff = 5.56 cfs @ 12.14 hrs, Volume= 0.458 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
28,611	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
31,929	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
68,732	84	Weighted Average
36,243		52.73% Pervious Area
32,489		47.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-TWO PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment EWS-18: EWS-18 NE corner (Fields)

Runoff = 0.39 cfs @ 12.16 hrs, Volume= 0.033 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	7,902	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	7,902	70	Weighted Average
	7,902		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment EWS-19: EWS-19 Tri-Country Drive to CB

Runoff = 1.35 cfs @ 12.08 hrs, Volume= 0.110 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	11,472	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	11,472	98	Weighted Average
	11,472		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-2: EWS-2 Main Bldg & NW Parking

Runoff = 20.99 cfs @ 12.16 hrs, Volume= 1.876 af, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	160,713	98	Paved parking & bldg, HSG C
	67,283	74	>75% Grass cover, Good, HSG C
	5,180	87	Dirt roads, HSG C
	233,176	91	Weighted Average
	72,463		31.08% Pervious Area
	160,713		68.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0134	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
2.7	130	0.0134	0.81		**Shallow Concentrated Flow, SCF 130 FT** Short Grass Pasture Kv= 7.0 fps
1.8	133	0.0324	1.26		**Shallow Concentrated Flow, SCF 133 FT** Short Grass Pasture Kv= 7.0 fps
0.3	190	0.0180	9.43	16.66	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.3	145	0.0110	8.93	28.04	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
11.7	648	Total			

Summary for Subcatchment EWS-3: EWS-3 E half Main Parking

Runoff = 8.97 cfs @ 12.09 hrs, Volume= 0.672 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
57,471	98	Paved parking, HSG C
28,226	74	>75% Grass cover, Good, HSG C
85,697	90	Weighted Average
28,226		32.94% Pervious Area
57,471		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0360	0.19		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	325	0.0230	3.08		**Shallow Concentrated Flow, SCF 325 FT** Paved Kv= 20.3 fps
0.1	56	0.0196	7.51	5.89	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.1	55	0.0100	8.51	26.74	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
6.4	486	Total			

Summary for Subcatchment EWS-4: EWS-4 W half of Main Parking

Runoff = 8.60 cfs @ 12.08 hrs, Volume= 0.652 af, Depth= 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
60,601	98	Paved parking, HSG C
16,467	74	>75% Grass cover, Good, HSG C
77,068	93	Weighted Average
16,467		21.37% Pervious Area
60,601		78.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-5: EWS-5 S Bldg & S half of E Parking

Runoff = 13.82 cfs @ 12.08 hrs, Volume= 1.038 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	94,210	98	Paved parking & bldg, HSG C
	31,540	74	>75% Grass cover, Good, HSG C
	125,750	92	Weighted Average
	31,540		25.08% Pervious Area
	94,210		74.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-7: EWS-7 "B-Series" Wetland Tributary

Runoff = 3.57 cfs @ 12.17 hrs, Volume= 0.312 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
73,809	70	Woods, Good, HSG C
73,809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	13	0.0460	0.07		**Sheet Flow, SHEET 13 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
7.1	87	0.2370	0.20		**Sheet Flow, SHEET 87 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	121	0.0660	1.28		**Shallow Concentrated Flow, SCF 121 FT** Woodland Kv= 5.0 fps
11.7	221	Total			

Summary for Subcatchment EWS-8: EWS-8 "A-Series" Wetland Tributary

Runoff = 4.25 cfs @ 12.17 hrs, Volume= 0.371 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
6,940	74	>75% Grass cover, Good, HSG C
68,992	70	Woods, Good, HSG C
5,720	96	Gravel surface, HSG C
81,652	72	Weighted Average
81,652		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1230	0.16		**Sheet Flow, SHEET 100 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	169	0.1240	1.76		**Shallow Concentrated Flow, SCF 169 FT** Woodland Kv= 5.0 fps
12.0	269	Total			

Summary for Subcatchment EWS-9: EWS-9 W Solar Field

Runoff = 6.06 cfs @ 12.19 hrs, Volume= 0.546 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
31,792	74	>75% Grass cover, Good, HSG C
79,016	74	>75% Grass cover, Good, HSG C
170	70	Woods, Good, HSG C
959	96	Gravel surface, HSG C
111,937	74	Weighted Average
111,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0280	0.17		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
8.4	497	0.0200	0.99		**Shallow Concentrated Flow, SCF 497 FT** Short Grass Pasture Kv= 7.0 fps
13.3	547	Total			

Summary for Pond 1P: SE corner Depression

Inflow Area = 3.992 ac, 0.00% Impervious, Inflow Depth = 2.46" for 10-year event
Inflow = 7.12 cfs @ 12.34 hrs, Volume= 0.819 af
Outflow = 7.09 cfs @ 12.36 hrs, Volume= 0.729 af, Atten= 0%, Lag= 1.0 min
Primary = 7.09 cfs @ 12.36 hrs, Volume= 0.729 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.40' @ 12.36 hrs Surf.Area= 4,293 sf Storage= 4,515 cf

Plug-Flow detention time= 74.9 min calculated for 0.729 af (89% of inflow)
Center-of-Mass det. time= 22.4 min (877.1 - 854.6)

Volume	Invert	Avail.Storage	Storage Description
#1	376.00'	7,495 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.00	2,443	204.0	0	0	2,443
377.00	3,528	247.0	2,969	2,969	4,003
378.00	5,603	325.0	4,526	7,495	7,565

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=7.09 cfs @ 12.36 hrs HW=377.40' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 7.09 cfs @ 0.97 fps)

Stage-Area-Storage for Pond 1P: SE corner Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.00	2,443	0	377.04	3,602	3,112
376.02	2,463	49	377.06	3,639	3,184
376.04	2,483	99	377.08	3,676	3,257
376.06	2,502	148	377.10	3,714	3,331
376.08	2,522	199	377.12	3,752	3,406
376.10	2,543	249	377.14	3,790	3,481
376.12	2,563	300	377.16	3,828	3,557
376.14	2,583	352	377.18	3,866	3,634
376.16	2,603	404	377.20	3,905	3,712
376.18	2,624	456	377.22	3,944	3,790
376.20	2,644	509	377.24	3,982	3,870
376.22	2,665	562	377.26	4,022	3,950
376.24	2,685	615	377.28	4,061	4,030
376.26	2,706	669	377.30	4,100	4,112
376.28	2,727	723	377.32	4,140	4,195
376.30	2,748	778	377.34	4,180	4,278
376.32	2,769	833	377.36	4,220	4,362
376.34	2,790	889	377.38	4,260	4,447
376.36	2,811	945	377.40	4,301	4,532
376.38	2,832	1,001	377.42	4,341	4,619
376.40	2,853	1,058	377.44	4,382	4,706
376.42	2,874	1,115	377.46	4,423	4,794
376.44	2,896	1,173	377.48	4,464	4,883
376.46	2,917	1,231	377.50	4,506	4,972
376.48	2,939	1,290	377.52	4,547	5,063
376.50	2,961	1,349	377.54	4,589	5,154
376.52	2,982	1,408	377.56	4,631	5,246
376.54	3,004	1,468	377.58	4,673	5,340
376.56	3,026	1,528	377.60	4,716	5,433
376.58	3,048	1,589	377.62	4,758	5,528
376.60	3,070	1,650	377.64	4,801	5,624
376.62	3,092	1,712	377.66	4,844	5,720
376.64	3,114	1,774	377.68	4,887	5,818
376.66	3,137	1,837	377.70	4,930	5,916
376.68	3,159	1,900	377.72	4,974	6,015
376.70	3,182	1,963	377.74	5,018	6,115
376.72	3,204	2,027	377.76	5,061	6,215
376.74	3,227	2,091	377.78	5,106	6,317
376.76	3,249	2,156	377.80	5,150	6,420
376.78	3,272	2,221	377.82	5,194	6,523
376.80	3,295	2,287	377.84	5,239	6,627
376.82	3,318	2,353	377.86	5,284	6,733
376.84	3,341	2,419	377.88	5,329	6,839
376.86	3,364	2,487	377.90	5,374	6,946
376.88	3,387	2,554	377.92	5,419	7,054
376.90	3,411	2,622	377.94	5,465	7,163
376.92	3,434	2,690	377.96	5,511	7,272
376.94	3,457	2,759	377.98	5,557	7,383
376.96	3,481	2,829	378.00	**5,603**	**7,495**
376.98	3,504	2,899			
377.00	3,528	2,969			
377.02	3,565	3,040			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 6.531 ac, 54.42% Impervious, Inflow Depth = 3.79" for 10-year event
Inflow = 25.66 cfs @ 12.09 hrs, Volume= 2.061 af
Outflow = 17.64 cfs @ 12.19 hrs, Volume= 2.061 af, Atten= 31%, Lag= 5.9 min
Primary = 17.64 cfs @ 12.19 hrs, Volume= 2.061 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 307.75' @ 12.19 hrs Surf.Area= 2,481 sf Storage= 5,464 cf

Plug-Flow detention time= 1.6 min calculated for 2.061 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (793.2 - 791.5)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=17.63 cfs @ 12.19 hrs HW=307.75' (Free Discharge)
↑**1=Culvert** (Inlet Controls 17.63 cfs @ 9.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.70' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 9.015 ac, 55.56% Impervious, Inflow Depth = 3.81" for 10-year event
Inflow = 31.93 cfs @ 12.13 hrs, Volume= 2.860 af
Outflow = 28.58 cfs @ 12.20 hrs, Volume= 2.849 af, Atten= 10%, Lag= 3.8 min
Primary = 28.58 cfs @ 12.20 hrs, Volume= 2.849 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 313.81' @ 12.20 hrs Surf.Area= 3,863 sf Storage= 4,168 cf

Plug-Flow detention time= 5.8 min calculated for 2.848 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (800.3 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=28.58 cfs @ 12.20 hrs HW=313.81' (Free Discharge)
↑**1=Culvert** (Inlet Controls 28.58 cfs @ 5.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road

Inflow Area = 32.521 ac, 42.36% Impervious, Inflow Depth = 3.49" for 10-year event
Inflow = 96.97 cfs @ 12.18 hrs, Volume= 9.462 af
Primary = 96.97 cfs @ 12.18 hrs, Volume= 9.462 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 3.329 ac, 2.32% Impervious, Inflow Depth = 2.53" for 10-year event
Inflow = 7.77 cfs @ 12.19 hrs, Volume= 0.702 af
Primary = 7.77 cfs @ 12.19 hrs, Volume= 0.702 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 4.996 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 8.63 cfs @ 12.34 hrs, Volume= 0.921 af
Primary = 8.63 cfs @ 12.34 hrs, Volume= 0.921 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.087 ac, 0.00% Impervious, Inflow Depth = 3.00" for 10-year event
Inflow = 6.38 cfs @ 12.14 hrs, Volume= 0.522 af
Primary = 6.38 cfs @ 12.14 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 1.578 ac, 47.27% Impervious, Inflow Depth = 3.48" for 10-year event
Inflow = 5.56 cfs @ 12.14 hrs, Volume= 0.458 af
Primary = 5.56 cfs @ 12.14 hrs, Volume= 0.458 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 1.124 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10-year event
Inflow = 2.10 cfs @ 12.26 hrs, Volume= 0.215 af
Primary = 2.10 cfs @ 12.26 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.181 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 0.39 cfs @ 12.16 hrs, Volume= 0.033 af
Primary = 0.39 cfs @ 12.16 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWS-1: EWS-1 N Bldg, N Runoff Area=727,994 sf 29.62% Impervious Runoff Depth=4.25"
Flow Length=1,790' Tc=12.8 min CN=81 Runoff=66.40 cfs 5.919 af

SubcatchmentEWS-10: EWS-10 E Solar Runoff Area=173,887 sf 0.00% Impervious Runoff Depth=3.42"
Flow Length=852' Tc=24.2 min CN=73 Runoff=9.97 cfs 1.139 af

SubcatchmentEWS-13: EWS-13 S of E Runoff Area=33,059 sf 10.17% Impervious Runoff Depth=3.42"
Flow Length=261' Tc=13.5 min CN=73 Runoff=2.40 cfs 0.217 af

SubcatchmentEWS-14: EWS-14 S of Solar Runoff Area=43,733 sf 0.00% Impervious Runoff Depth=3.22"
Flow Length=213' Tc=14.2 min CN=71 Runoff=2.93 cfs 0.270 af

SubcatchmentEWS-15: EWS-15 "D-Series" Runoff Area=90,898 sf 0.00% Impervious Runoff Depth=4.04"
Flow Length=376' Tc=10.2 min CN=79 Runoff=8.56 cfs 0.702 af

SubcatchmentEWS-16: EWS-16 NE corner Runoff Area=48,959 sf 0.00% Impervious Runoff Depth=3.22"
Flow Length=252' Tc=18.0 min CN=71 Runoff=2.98 cfs 0.302 af

SubcatchmentEWS-17: EWS-17 Runoff Area=68,732 sf 47.27% Impervious Runoff Depth=4.57"
Flow Length=283' Tc=10.1 min CN=84 Runoff=7.24 cfs 0.601 af

SubcatchmentEWS-18: EWS-18 NE corner Runoff Area=7,902 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.56 cfs 0.047 af

SubcatchmentEWS-19: EWS-19 Runoff Area=11,472 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=1.65 cfs 0.135 af

SubcatchmentEWS-2: EWS-2 Main Bldg Runoff Area=233,176 sf 68.92% Impervious Runoff Depth=5.35"
Flow Length=648' Tc=11.7 min CN=91 Runoff=26.35 cfs 2.386 af

SubcatchmentEWS-3: EWS-3 E half Main Runoff Area=85,697 sf 67.06% Impervious Runoff Depth=5.24"
Flow Length=486' Tc=6.4 min CN=90 Runoff=11.30 cfs 0.858 af

SubcatchmentEWS-4: EWS-4 W half of Runoff Area=77,068 sf 78.63% Impervious Runoff Depth=5.58"
Tc=6.0 min CN=93 Runoff=10.70 cfs 0.822 af

SubcatchmentEWS-5: EWS-5 S Bldg & S Runoff Area=125,750 sf 74.92% Impervious Runoff Depth=5.46"
Tc=6.0 min CN=92 Runoff=17.26 cfs 1.314 af

SubcatchmentEWS-7: EWS-7 "B-Series" Runoff Area=73,809 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=221' Tc=11.7 min CN=70 Runoff=5.12 cfs 0.441 af

SubcatchmentEWS-8: EWS-8 "A-Series" Runoff Area=81,652 sf 0.00% Impervious Runoff Depth=3.32"
Flow Length=269' Tc=12.0 min CN=72 Runoff=5.99 cfs 0.519 af

SubcatchmentEWS-9: EWS-9 W Solar Runoff Area=111,937 sf 0.00% Impervious Runoff Depth=3.52"
Flow Length=547' Tc=13.3 min CN=74 Runoff=8.41 cfs 0.755 af

Pond 1P: SE corner Depression Peak Elev=377.43' Storage=4,674 cf Inflow=9.97 cfs 1.139 af
Outflow=9.94 cfs 1.049 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=308.83' Storage=8,737 cf Inflow=32.62 cfs 2.656 af
Primary=19.74 cfs 2.636 af Secondary=2.83 cfs 0.020 af Outflow=22.57 cfs 2.656 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=314.42' Storage=7,023 cf Inflow=40.77 cfs 3.686 af
Primary=34.04 cfs 3.675 af Secondary=0.00 cfs 0.000 af Outflow=34.04 cfs 3.675 af

Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road Inflow=120.60 cfs 12.365 af
Primary=120.60 cfs 12.365 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=10.81 cfs 0.971 af
Primary=10.81 cfs 0.971 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=12.12 cfs 1.319 af
Primary=12.12 cfs 1.319 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=8.56 cfs 0.702 af
Primary=8.56 cfs 0.702 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=9.50 cfs 0.621 af
Primary=9.50 cfs 0.621 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=2.98 cfs 0.302 af
Primary=2.98 cfs 0.302 af

Link POA-9: POA-9 Residences Inflow=0.56 cfs 0.047 af
Primary=0.56 cfs 0.047 af

Total Runoff Area = 45.816 ac Runoff Volume = 16.428 af Average Runoff Depth = 4.30"
68.14% Pervious = 31.217 ac 31.86% Impervious = 14.599 ac

Summary for Subcatchment EWS-1: EWS-1 N Bldg, N half of E Parking & Fields

Runoff = 66.40 cfs @ 12.17 hrs, Volume= 5.919 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	215,603	98	Paved parking & bldg, HSG C
	413,613	74	>75% Grass cover, Good, HSG C
	84,772	70	Woods, Good, HSG C
	14,006	87	Dirt roads, HSG C
	727,994	81	Weighted Average
	512,391		70.38% Pervious Area
	215,603		29.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	244	0.0150	0.86		**Shallow Concentrated Flow, SCF 244 FT** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.4687	4.79		**Shallow Concentrated Flow, SCF 32 FT** Short Grass Pasture Kv= 7.0 fps
0.4	32	0.0050	1.44		**Shallow Concentrated Flow, SCF 32 FT** Paved Kv= 20.3 fps
0.6	287	0.0110	7.37	13.02	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.2	232	0.0330	17.94	88.06	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
0.2	133	0.0100	9.88	48.47	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
12.8	1,790	Total			

Summary for Subcatchment EWS-10: EWS-10 E Solar Field

Runoff = 9.97 cfs @ 12.34 hrs, Volume= 1.139 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
42,967	74	>75% Grass cover, Good, HSG C
105,590	74	>75% Grass cover, Good, HSG C
25,330	70	Woods, Good, HSG C
173,887	73	Weighted Average
173,887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET FLOW 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.3	281	0.0240	1.08		**Shallow Concentrated Flow, SCF 281 FT** Short Grass Pasture Kv= 7.0 fps
13.1	440	0.0125	0.56		**Shallow Concentrated Flow, SCF 440 FT WOODS** Woodland Kv= 5.0 fps
1.2	81	0.0270	1.15		**Shallow Concentrated Flow, SCF 81 FT** Short Grass Pasture Kv= 7.0 fps
24.2	852	Total			

Summary for Subcatchment EWS-13: EWS-13 S of E Parking

Runoff = 2.40 cfs @ 12.19 hrs, Volume= 0.217 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	3,362	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	29,697	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	33,059	73	Weighted Average
	29,697		89.83% Pervious Area
	3,362		10.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.0	211	0.0560	1.18		**Shallow Concentrated Flow, SCF 211 FT WOODS** Woodland Kv= 5.0 fps
13.5	261	Total			

Summary for Subcatchment EWS-14: EWS-14 S of Solar Field

Runoff = 2.93 cfs @ 12.20 hrs, Volume= 0.270 af, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	10,165	74	>75% Grass cover, Good, HSG C
	33,568	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	43,733	71	Weighted Average
	43,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	163	0.0210	0.72		**Shallow Concentrated Flow, SCF 163 FT WOODS** Woodland Kv= 5.0 fps
14.2	213	Total			

Summary for Subcatchment EWS-15: EWS-15 "D-Series" Wetland Tributary

Runoff = 8.56 cfs @ 12.14 hrs, Volume= 0.702 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
79,801	77	Woods, Good, HSG D
11,097	96	Gravel surface, HSG D
90,898	79	Weighted Average
90,898		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment EWS-16: EWS-16 NE corner (near Solar Field)

Runoff = 2.98 cfs @ 12.26 hrs, Volume= 0.302 af, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	6,639	74	>75% Grass cover, Good, HSG C
	42,320	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	48,959	71	Weighted Average
	48,959		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	50	0.0140	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	202	0.0310	0.88		**Shallow Concentrated Flow, SCF 202 FT WOODS** Woodland Kv= 5.0 fps
18.0	252	Total			

Summary for Subcatchment EWS-17: EWS-17 Tri-Country Drive Tributary

Runoff = 7.24 cfs @ 12.14 hrs, Volume= 0.601 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
28,611	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
31,929	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
68,732	84	Weighted Average
36,243		52.73% Pervious Area
32,489		47.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-TWO PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment EWS-18: EWS-18 NE corner (Fields)

Runoff = 0.56 cfs @ 12.15 hrs, Volume= 0.047 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	7,902	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	7,902	70	Weighted Average
	7,902		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment EWS-19: EWS-19 Tri-Country Drive to CB

Runoff = 1.65 cfs @ 12.08 hrs, Volume= 0.135 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	11,472	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	11,472	98	Weighted Average
	11,472		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-2: EWS-2 Main Bldg & NW Parking

Runoff = 26.35 cfs @ 12.16 hrs, Volume= 2.386 af, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	160,713	98	Paved parking & bldg, HSG C
	67,283	74	>75% Grass cover, Good, HSG C
	5,180	87	Dirt roads, HSG C
	233,176	91	Weighted Average
	72,463		31.08% Pervious Area
	160,713		68.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0134	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
2.7	130	0.0134	0.81		**Shallow Concentrated Flow, SCF 130 FT** Short Grass Pasture Kv= 7.0 fps
1.8	133	0.0324	1.26		**Shallow Concentrated Flow, SCF 133 FT** Short Grass Pasture Kv= 7.0 fps
0.3	190	0.0180	9.43	16.66	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.3	145	0.0110	8.93	28.04	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
11.7	648	Total			

Summary for Subcatchment EWS-3: EWS-3 E half Main Parking

Runoff = 11.30 cfs @ 12.09 hrs, Volume= 0.858 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
57,471	98	Paved parking, HSG C
28,226	74	>75% Grass cover, Good, HSG C
85,697	90	Weighted Average
28,226		32.94% Pervious Area
57,471		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0360	0.19		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	325	0.0230	3.08		**Shallow Concentrated Flow, SCF 325 FT** Paved Kv= 20.3 fps
0.1	56	0.0196	7.51	5.89	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.1	55	0.0100	8.51	26.74	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
6.4	486	Total			

Summary for Subcatchment EWS-4: EWS-4 W half of Main Parking

Runoff = 10.70 cfs @ 12.08 hrs, Volume= 0.822 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
60,601	98	Paved parking, HSG C
16,467	74	>75% Grass cover, Good, HSG C
77,068	93	Weighted Average
16,467		21.37% Pervious Area
60,601		78.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-5: EWS-5 S Bldg & S half of E Parking

Runoff = 17.26 cfs @ 12.08 hrs, Volume= 1.314 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	94,210	98	Paved parking & bldg, HSG C
	31,540	74	>75% Grass cover, Good, HSG C
	125,750	92	Weighted Average
	31,540		25.08% Pervious Area
	94,210		74.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-7: EWS-7 "B-Series" Wetland Tributary

Runoff = 5.12 cfs @ 12.16 hrs, Volume= 0.441 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
73,809	70	Woods, Good, HSG C
73,809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	13	0.0460	0.07		**Sheet Flow, SHEET 13 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
7.1	87	0.2370	0.20		**Sheet Flow, SHEET 87 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	121	0.0660	1.28		**Shallow Concentrated Flow, SCF 121 FT** Woodland Kv= 5.0 fps
11.7	221	Total			

Summary for Subcatchment EWS-8: EWS-8 "A-Series" Wetland Tributary

Runoff = 5.99 cfs @ 12.17 hrs, Volume= 0.519 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
6,940	74	>75% Grass cover, Good, HSG C
68,992	70	Woods, Good, HSG C
5,720	96	Gravel surface, HSG C
81,652	72	Weighted Average
81,652		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1230	0.16		**Sheet Flow, SHEET 100 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	169	0.1240	1.76		**Shallow Concentrated Flow, SCF 169 FT** Woodland Kv= 5.0 fps
12.0	269	Total			

Summary for Subcatchment EWS-9: EWS-9 W Solar Field

Runoff = 8.41 cfs @ 12.19 hrs, Volume= 0.755 af, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
31,792	74	>75% Grass cover, Good, HSG C
79,016	74	>75% Grass cover, Good, HSG C
170	70	Woods, Good, HSG C
959	96	Gravel surface, HSG C
111,937	74	Weighted Average
111,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0280	0.17		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
8.4	497	0.0200	0.99		**Shallow Concentrated Flow, SCF 497 FT** Short Grass Pasture Kv= 7.0 fps
13.3	547	Total			

Summary for Pond 1P: SE corner Depression

Inflow Area = 3.992 ac, 0.00% Impervious, Inflow Depth = 3.42" for 25-year event
Inflow = 9.97 cfs @ 12.34 hrs, Volume= 1.139 af
Outflow = 9.94 cfs @ 12.35 hrs, Volume= 1.049 af, Atten= 0%, Lag= 0.8 min
Primary = 9.94 cfs @ 12.35 hrs, Volume= 1.049 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.43' @ 12.35 hrs Surf.Area= 4,367 sf Storage= 4,674 cf

Plug-Flow detention time= 58.5 min calculated for 1.049 af (92% of inflow)
Center-of-Mass det. time= 18.2 min (863.3 - 845.1)

Volume	Invert	Avail.Storage	Storage Description
#1	376.00'	7,495 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.00	2,443	204.0	0	0	2,443
377.00	3,528	247.0	2,969	2,969	4,003
378.00	5,603	325.0	4,526	7,495	7,565

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=9.93 cfs @ 12.35 hrs HW=377.43' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 9.93 cfs @ 1.09 fps)

Stage-Area-Storage for Pond 1P: SE corner Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.00	2,443	0	377.04	3,602	3,112
376.02	2,463	49	377.06	3,639	3,184
376.04	2,483	99	377.08	3,676	3,257
376.06	2,502	148	377.10	3,714	3,331
376.08	2,522	199	377.12	3,752	3,406
376.10	2,543	249	377.14	3,790	3,481
376.12	2,563	300	377.16	3,828	3,557
376.14	2,583	352	377.18	3,866	3,634
376.16	2,603	404	377.20	3,905	3,712
376.18	2,624	456	377.22	3,944	3,790
376.20	2,644	509	377.24	3,982	3,870
376.22	2,665	562	377.26	4,022	3,950
376.24	2,685	615	377.28	4,061	4,030
376.26	2,706	669	377.30	4,100	4,112
376.28	2,727	723	377.32	4,140	4,195
376.30	2,748	778	377.34	4,180	4,278
376.32	2,769	833	377.36	4,220	4,362
376.34	2,790	889	377.38	4,260	4,447
376.36	2,811	945	377.40	4,301	4,532
376.38	2,832	1,001	377.42	4,341	4,619
376.40	2,853	1,058	377.44	4,382	4,706
376.42	2,874	1,115	377.46	4,423	4,794
376.44	2,896	1,173	377.48	4,464	4,883
376.46	2,917	1,231	377.50	4,506	4,972
376.48	2,939	1,290	377.52	4,547	5,063
376.50	2,961	1,349	377.54	4,589	5,154
376.52	2,982	1,408	377.56	4,631	5,246
376.54	3,004	1,468	377.58	4,673	5,340
376.56	3,026	1,528	377.60	4,716	5,433
376.58	3,048	1,589	377.62	4,758	5,528
376.60	3,070	1,650	377.64	4,801	5,624
376.62	3,092	1,712	377.66	4,844	5,720
376.64	3,114	1,774	377.68	4,887	5,818
376.66	3,137	1,837	377.70	4,930	5,916
376.68	3,159	1,900	377.72	4,974	6,015
376.70	3,182	1,963	377.74	5,018	6,115
376.72	3,204	2,027	377.76	5,061	6,215
376.74	3,227	2,091	377.78	5,106	6,317
376.76	3,249	2,156	377.80	5,150	6,420
376.78	3,272	2,221	377.82	5,194	6,523
376.80	3,295	2,287	377.84	5,239	6,627
376.82	3,318	2,353	377.86	5,284	6,733
376.84	3,341	2,419	377.88	5,329	6,839
376.86	3,364	2,487	377.90	5,374	6,946
376.88	3,387	2,554	377.92	5,419	7,054
376.90	3,411	2,622	377.94	5,465	7,163
376.92	3,434	2,690	377.96	5,511	7,272
376.94	3,457	2,759	377.98	5,557	7,383
376.96	3,481	2,829	378.00	**5,603**	**7,495**
376.98	3,504	2,899			
377.00	3,528	2,969			
377.02	3,565	3,040			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 6.531 ac, 54.42% Impervious, Inflow Depth = 4.88" for 25-year event
Inflow = 32.62 cfs @ 12.09 hrs, Volume= 2.656 af
Outflow = 22.57 cfs @ 12.19 hrs, Volume= 2.656 af, Atten= 31%, Lag= 5.9 min
Primary = 19.74 cfs @ 12.19 hrs, Volume= 2.636 af
Secondary = 2.83 cfs @ 12.19 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 308.83' @ 12.19 hrs Surf.Area= 3,624 sf Storage= 8,737 cf

Plug-Flow detention time= 2.2 min calculated for 2.655 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (788.1 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=19.74 cfs @ 12.19 hrs HW=308.83' (Free Discharge)
↑**1=Culvert** (Inlet Controls 19.74 cfs @ 11.17 fps)

Secondary OutFlow Max=2.82 cfs @ 12.19 hrs HW=308.83' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 2.82 cfs @ 1.22 fps)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 9.015 ac, 55.56% Impervious, Inflow Depth = 4.91" for 25-year event
Inflow = 40.77 cfs @ 12.13 hrs, Volume= 3.686 af
Outflow = 34.04 cfs @ 12.22 hrs, Volume= 3.675 af, Atten= 16%, Lag= 5.1 min
Primary = 34.04 cfs @ 12.22 hrs, Volume= 3.675 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 314.42' @ 12.22 hrs Surf.Area= 5,462 sf Storage= 7,023 cf

Plug-Flow detention time= 5.2 min calculated for 3.674 af (100% of inflow)
Center-of-Mass det. time= 3.2 min (794.0 - 790.8)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=34.04 cfs @ 12.22 hrs HW=314.42' (Free Discharge)
↑**1=Culvert** (Inlet Controls 34.04 cfs @ 6.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road

Inflow Area = 32.521 ac, 42.36% Impervious, Inflow Depth = 4.56" for 25-year event
Inflow = 120.60 cfs @ 12.18 hrs, Volume= 12.365 af
Primary = 120.60 cfs @ 12.18 hrs, Volume= 12.365 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 3.329 ac, 2.32% Impervious, Inflow Depth = 3.50" for 25-year event
Inflow = 10.81 cfs @ 12.19 hrs, Volume= 0.971 af
Primary = 10.81 cfs @ 12.19 hrs, Volume= 0.971 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 4.996 ac, 0.00% Impervious, Inflow Depth = 3.17" for 25-year event
Inflow = 12.12 cfs @ 12.32 hrs, Volume= 1.319 af
Primary = 12.12 cfs @ 12.32 hrs, Volume= 1.319 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.087 ac, 0.00% Impervious, Inflow Depth = 4.04" for 25-year event
Inflow = 8.56 cfs @ 12.14 hrs, Volume= 0.702 af
Primary = 8.56 cfs @ 12.14 hrs, Volume= 0.702 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 1.578 ac, 47.27% Impervious, Inflow Depth = 4.73" for 25-year event
Inflow = 9.50 cfs @ 12.18 hrs, Volume= 0.621 af
Primary = 9.50 cfs @ 12.18 hrs, Volume= 0.621 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 1.124 ac, 0.00% Impervious, Inflow Depth = 3.22" for 25-year event
Inflow = 2.98 cfs @ 12.26 hrs, Volume= 0.302 af
Primary = 2.98 cfs @ 12.26 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.181 ac, 0.00% Impervious, Inflow Depth = 3.13" for 25-year event
Inflow = 0.56 cfs @ 12.15 hrs, Volume= 0.047 af
Primary = 0.56 cfs @ 12.15 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEWS-1: EWS-1 N Bldg, N Runoff Area=727,994 sf 29.62% Impervious Runoff Depth=5.93"
Flow Length=1,790' Tc=12.8 min CN=81 Runoff=91.69 cfs 8.260 af

SubcatchmentEWS-10: EWS-10 E Solar Runoff Area=173,887 sf 0.00% Impervious Runoff Depth=4.99"
Flow Length=852' Tc=24.2 min CN=73 Runoff=14.52 cfs 1.659 af

SubcatchmentEWS-13: EWS-13 S of E Runoff Area=33,059 sf 10.17% Impervious Runoff Depth=4.99"
Flow Length=261' Tc=13.5 min CN=73 Runoff=3.49 cfs 0.315 af

SubcatchmentEWS-14: EWS-14 S of Solar Runoff Area=43,733 sf 0.00% Impervious Runoff Depth=4.75"
Flow Length=213' Tc=14.2 min CN=71 Runoff=4.33 cfs 0.398 af

SubcatchmentEWS-15: EWS-15 "D-Series" Runoff Area=90,898 sf 0.00% Impervious Runoff Depth=5.69"
Flow Length=376' Tc=10.2 min CN=79 Runoff=11.95 cfs 0.990 af

SubcatchmentEWS-16: EWS-16 NE corner Runoff Area=48,959 sf 0.00% Impervious Runoff Depth=4.75"
Flow Length=252' Tc=18.0 min CN=71 Runoff=4.41 cfs 0.445 af

SubcatchmentEWS-17: EWS-17 Runoff Area=68,732 sf 47.27% Impervious Runoff Depth=6.29"
Flow Length=283' Tc=10.1 min CN=84 Runoff=9.82 cfs 0.827 af

SubcatchmentEWS-18: EWS-18 NE corner Runoff Area=7,902 sf 0.00% Impervious Runoff Depth=4.64"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.84 cfs 0.070 af

SubcatchmentEWS-19: EWS-19 Runoff Area=11,472 sf 100.00% Impervious Runoff Depth=7.96"
Tc=6.0 min CN=98 Runoff=2.12 cfs 0.175 af

SubcatchmentEWS-2: EWS-2 Main Bldg Runoff Area=233,176 sf 68.92% Impervious Runoff Depth=7.12"
Flow Length=648' Tc=11.7 min CN=91 Runoff=34.54 cfs 3.177 af

SubcatchmentEWS-3: EWS-3 E half Main Runoff Area=85,697 sf 67.06% Impervious Runoff Depth=7.00"
Flow Length=486' Tc=6.4 min CN=90 Runoff=14.87 cfs 1.148 af

SubcatchmentEWS-4: EWS-4 W half of Runoff Area=77,068 sf 78.63% Impervious Runoff Depth=7.36"
Tc=6.0 min CN=93 Runoff=13.90 cfs 1.085 af

SubcatchmentEWS-5: EWS-5 S Bldg & S Runoff Area=125,750 sf 74.92% Impervious Runoff Depth=7.24"
Tc=6.0 min CN=92 Runoff=22.52 cfs 1.742 af

SubcatchmentEWS-7: EWS-7 "B-Series" Runoff Area=73,809 sf 0.00% Impervious Runoff Depth=4.64"
Flow Length=221' Tc=11.7 min CN=70 Runoff=7.64 cfs 0.655 af

SubcatchmentEWS-8: EWS-8 "A-Series" Runoff Area=81,652 sf 0.00% Impervious Runoff Depth=4.87"
Flow Length=269' Tc=12.0 min CN=72 Runoff=8.79 cfs 0.761 af

SubcatchmentEWS-9: EWS-9 W Solar Runoff Area=111,937 sf 0.00% Impervious Runoff Depth=5.10"
Flow Length=547' Tc=13.3 min CN=74 Runoff=12.15 cfs 1.093 af

Pond 1P: SE corner Depression Peak Elev=377.48' Storage=4,902 cf Inflow=14.52 cfs 1.659 af
Outflow=14.49 cfs 1.569 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=309.36' Storage=10,806 cf Inflow=43.37 cfs 3.625 af
Primary=20.69 cfs 3.374 af Secondary=17.33 cfs 0.251 af Outflow=38.02 cfs 3.625 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=315.23' Storage=12,368 cf Inflow=54.41 cfs 4.980 af
Primary=40.11 cfs 4.932 af Secondary=4.46 cfs 0.037 af Outflow=44.57 cfs 4.969 af

Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road Inflow=152.93 cfs 16.741 af
Primary=152.93 cfs 16.741 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=15.64 cfs 1.409 af
Primary=15.64 cfs 1.409 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=17.73 cfs 1.967 af
Primary=17.73 cfs 1.967 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=11.95 cfs 0.990 af
Primary=11.95 cfs 0.990 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=27.14 cfs 1.078 af
Primary=27.14 cfs 1.078 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=4.41 cfs 0.445 af
Primary=4.41 cfs 0.445 af

Link POA-9: POA-9 Residences Inflow=0.84 cfs 0.070 af
Primary=0.84 cfs 0.070 af

Total Runoff Area = 45.816 ac Runoff Volume = 22.801 af Average Runoff Depth = 5.97"
68.14% Pervious = 31.217 ac 31.86% Impervious = 14.599 ac

Summary for Subcatchment EWS-1: EWS-1 N Bldg, N half of E Parking & Fields

Runoff = 91.69 cfs @ 12.17 hrs, Volume= 8.260 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	215,603	98	Paved parking & bldg, HSG C
	413,613	74	>75% Grass cover, Good, HSG C
	84,772	70	Woods, Good, HSG C
	14,006	87	Dirt roads, HSG C
	727,994	81	Weighted Average
	512,391		70.38% Pervious Area
	215,603		29.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	244	0.0150	0.86		**Shallow Concentrated Flow, SCF 244 FT** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.4687	4.79		**Shallow Concentrated Flow, SCF 32 FT** Short Grass Pasture Kv= 7.0 fps
0.4	32	0.0050	1.44		**Shallow Concentrated Flow, SCF 32 FT** Paved Kv= 20.3 fps
0.6	287	0.0110	7.37	13.02	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.2	232	0.0330	17.94	88.06	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
0.2	133	0.0100	9.88	48.47	**Pipe Channel, RCP_Round 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
12.8	1,790	Total			

Summary for Subcatchment EWS-10: EWS-10 E Solar Field

Runoff = 14.52 cfs @ 12.34 hrs, Volume= 1.659 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
42,967	74	>75% Grass cover, Good, HSG C
105,590	74	>75% Grass cover, Good, HSG C
25,330	70	Woods, Good, HSG C
173,887	73	Weighted Average
173,887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET FLOW 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.3	281	0.0240	1.08		**Shallow Concentrated Flow, SCF 281 FT** Short Grass Pasture Kv= 7.0 fps
13.1	440	0.0125	0.56		**Shallow Concentrated Flow, SCF 440 FT WOODS** Woodland Kv= 5.0 fps
1.2	81	0.0270	1.15		**Shallow Concentrated Flow, SCF 81 FT** Short Grass Pasture Kv= 7.0 fps
24.2	852	Total			

Summary for Subcatchment EWS-13: EWS-13 S of E Parking

Runoff = 3.49 cfs @ 12.19 hrs, Volume= 0.315 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	3,362	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	29,697	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	33,059	73	Weighted Average
	29,697		89.83% Pervious Area
	3,362		10.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.0	211	0.0560	1.18		**Shallow Concentrated Flow, SCF 211 FT WOODS** Woodland Kv= 5.0 fps
13.5	261	Total			

Summary for Subcatchment EWS-14: EWS-14 S of Solar Field

Runoff = 4.33 cfs @ 12.20 hrs, Volume= 0.398 af, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	10,165	74	>75% Grass cover, Good, HSG C
	33,568	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	43,733	71	Weighted Average
	43,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	163	0.0210	0.72		**Shallow Concentrated Flow, SCF 163 FT WOODS** Woodland Kv= 5.0 fps
14.2	213	Total			

Summary for Subcatchment EWS-15: EWS-15 "D-Series" Wetland Tributary

Runoff = 11.95 cfs @ 12.14 hrs, Volume= 0.990 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
79,801	77	Woods, Good, HSG D
11,097	96	Gravel surface, HSG D
90,898	79	Weighted Average
90,898		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment EWS-16: EWS-16 NE corner (near Solar Field)

Runoff = 4.41 cfs @ 12.25 hrs, Volume= 0.445 af, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	6,639	74	>75% Grass cover, Good, HSG C
	42,320	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	48,959	71	Weighted Average
	48,959		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	50	0.0140	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	202	0.0310	0.88		**Shallow Concentrated Flow, SCF 202 FT WOODS** Woodland Kv= 5.0 fps
18.0	252	Total			

Summary for Subcatchment EWS-17: EWS-17 Tri-Country Drive Tributary

Runoff = 9.82 cfs @ 12.14 hrs, Volume= 0.827 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
28,611	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
31,929	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
68,732	84	Weighted Average
36,243		52.73% Pervious Area
32,489		47.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-TWO PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment EWS-18: EWS-18 NE corner (Fields)

Runoff = 0.84 cfs @ 12.15 hrs, Volume= 0.070 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	0	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	7,902	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	7,902	70	Weighted Average
	7,902		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment EWS-19: EWS-19 Tri-Country Drive to CB

Runoff = 2.12 cfs @ 12.08 hrs, Volume= 0.175 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	11,472	98	Paved parking & bldg, HSG C
	0	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	0	87	Dirt roads, HSG C
	11,472	98	Weighted Average
	11,472		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-2: EWS-2 Main Bldg & NW Parking

Runoff = 34.54 cfs @ 12.15 hrs, Volume= 3.177 af, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	160,713	98	Paved parking & bldg, HSG C
	67,283	74	>75% Grass cover, Good, HSG C
	5,180	87	Dirt roads, HSG C
	233,176	91	Weighted Average
	72,463		31.08% Pervious Area
	160,713		68.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0134	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
2.7	130	0.0134	0.81		**Shallow Concentrated Flow, SCF 130 FT** Short Grass Pasture Kv= 7.0 fps
1.8	133	0.0324	1.26		**Shallow Concentrated Flow, SCF 133 FT** Short Grass Pasture Kv= 7.0 fps
0.3	190	0.0180	9.43	16.66	**Pipe Channel, RCP_Round 18"** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
0.3	145	0.0110	8.93	28.04	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
11.7	648	Total			

Summary for Subcatchment EWS-3: EWS-3 E half Main Parking

Runoff = 14.87 cfs @ 12.09 hrs, Volume= 1.148 af, Depth= 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
57,471	98	Paved parking, HSG C
28,226	74	>75% Grass cover, Good, HSG C
85,697	90	Weighted Average
28,226		32.94% Pervious Area
57,471		67.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0360	0.19		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	325	0.0230	3.08		**Shallow Concentrated Flow, SCF 325 FT** Paved Kv= 20.3 fps
0.1	56	0.0196	7.51	5.89	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
0.1	55	0.0100	8.51	26.74	**Pipe Channel, RCP_Round 24"** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011
6.4	486	Total			

Summary for Subcatchment EWS-4: EWS-4 W half of Main Parking

Runoff = 13.90 cfs @ 12.08 hrs, Volume= 1.085 af, Depth= 7.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
60,601	98	Paved parking, HSG C
16,467	74	>75% Grass cover, Good, HSG C
77,068	93	Weighted Average
16,467		21.37% Pervious Area
60,601		78.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-5: EWS-5 S Bldg & S half of E Parking

Runoff = 22.52 cfs @ 12.08 hrs, Volume= 1.742 af, Depth= 7.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	94,210	98	Paved parking & bldg, HSG C
	31,540	74	>75% Grass cover, Good, HSG C
	125,750	92	Weighted Average
	31,540		25.08% Pervious Area
	94,210		74.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment EWS-7: EWS-7 "B-Series" Wetland Tributary

Runoff = 7.64 cfs @ 12.16 hrs, Volume= 0.655 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
73,809	70	Woods, Good, HSG C
73,809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	13	0.0460	0.07		**Sheet Flow, SHEET 13 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
7.1	87	0.2370	0.20		**Sheet Flow, SHEET 87 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	121	0.0660	1.28		**Shallow Concentrated Flow, SCF 121 FT** Woodland Kv= 5.0 fps
11.7	221	Total			

Summary for Subcatchment EWS-8: EWS-8 "A-Series" Wetland Tributary

Runoff = 8.79 cfs @ 12.17 hrs, Volume= 0.761 af, Depth= 4.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
6,940	74	>75% Grass cover, Good, HSG C
68,992	70	Woods, Good, HSG C
5,720	96	Gravel surface, HSG C
81,652	72	Weighted Average
81,652		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1230	0.16		**Sheet Flow, SHEET 100 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	169	0.1240	1.76		**Shallow Concentrated Flow, SCF 169 FT** Woodland Kv= 5.0 fps
12.0	269	Total			

Summary for Subcatchment EWS-9: EWS-9 W Solar Field

Runoff = 12.15 cfs @ 12.18 hrs, Volume= 1.093 af, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
31,792	74	>75% Grass cover, Good, HSG C
79,016	74	>75% Grass cover, Good, HSG C
170	70	Woods, Good, HSG C
959	96	Gravel surface, HSG C
111,937	74	Weighted Average
111,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0280	0.17		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
8.4	497	0.0200	0.99		**Shallow Concentrated Flow, SCF 497 FT** Short Grass Pasture Kv= 7.0 fps
13.3	547	Total			

Summary for Pond 1P: SE corner Depression

Inflow Area = 3.992 ac, 0.00% Impervious, Inflow Depth = 4.99" for 100-year event
Inflow = 14.52 cfs @ 12.34 hrs, Volume= 1.659 af
Outflow = 14.49 cfs @ 12.35 hrs, Volume= 1.569 af, Atten= 0%, Lag= 0.6 min
Primary = 14.49 cfs @ 12.35 hrs, Volume= 1.569 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.48' @ 12.35 hrs Surf.Area= 4,474 sf Storage= 4,902 cf

Plug-Flow detention time= 44.6 min calculated for 1.569 af (95% of inflow)
Center-of-Mass det. time= 15.1 min (849.4 - 834.3)

Volume	Invert	Avail.Storage	Storage Description
#1	376.00'	7,495 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.00	2,443	204.0	0	0	2,443
377.00	3,528	247.0	2,969	2,969	4,003
378.00	5,603	325.0	4,526	7,495	7,565

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=14.48 cfs @ 12.35 hrs HW=377.48' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 14.48 cfs @ 1.24 fps)

Stage-Area-Storage for Pond 1P: SE corner Depression

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.00	2,443	0	377.04	3,602	3,112
376.02	2,463	49	377.06	3,639	3,184
376.04	2,483	99	377.08	3,676	3,257
376.06	2,502	148	377.10	3,714	3,331
376.08	2,522	199	377.12	3,752	3,406
376.10	2,543	249	377.14	3,790	3,481
376.12	2,563	300	377.16	3,828	3,557
376.14	2,583	352	377.18	3,866	3,634
376.16	2,603	404	377.20	3,905	3,712
376.18	2,624	456	377.22	3,944	3,790
376.20	2,644	509	377.24	3,982	3,870
376.22	2,665	562	377.26	4,022	3,950
376.24	2,685	615	377.28	4,061	4,030
376.26	2,706	669	377.30	4,100	4,112
376.28	2,727	723	377.32	4,140	4,195
376.30	2,748	778	377.34	4,180	4,278
376.32	2,769	833	377.36	4,220	4,362
376.34	2,790	889	377.38	4,260	4,447
376.36	2,811	945	377.40	4,301	4,532
376.38	2,832	1,001	377.42	4,341	4,619
376.40	2,853	1,058	377.44	4,382	4,706
376.42	2,874	1,115	377.46	4,423	4,794
376.44	2,896	1,173	377.48	4,464	4,883
376.46	2,917	1,231	377.50	4,506	4,972
376.48	2,939	1,290	377.52	4,547	5,063
376.50	2,961	1,349	377.54	4,589	5,154
376.52	2,982	1,408	377.56	4,631	5,246
376.54	3,004	1,468	377.58	4,673	5,340
376.56	3,026	1,528	377.60	4,716	5,433
376.58	3,048	1,589	377.62	4,758	5,528
376.60	3,070	1,650	377.64	4,801	5,624
376.62	3,092	1,712	377.66	4,844	5,720
376.64	3,114	1,774	377.68	4,887	5,818
376.66	3,137	1,837	377.70	4,930	5,916
376.68	3,159	1,900	377.72	4,974	6,015
376.70	3,182	1,963	377.74	5,018	6,115
376.72	3,204	2,027	377.76	5,061	6,215
376.74	3,227	2,091	377.78	5,106	6,317
376.76	3,249	2,156	377.80	5,150	6,420
376.78	3,272	2,221	377.82	5,194	6,523
376.80	3,295	2,287	377.84	5,239	6,627
376.82	3,318	2,353	377.86	5,284	6,733
376.84	3,341	2,419	377.88	5,329	6,839
376.86	3,364	2,487	377.90	5,374	6,946
376.88	3,387	2,554	377.92	5,419	7,054
376.90	3,411	2,622	377.94	5,465	7,163
376.92	3,434	2,690	377.96	5,511	7,272
376.94	3,457	2,759	377.98	5,557	7,383
376.96	3,481	2,829	378.00	**5,603**	**7,495**
376.98	3,504	2,899			
377.00	3,528	2,969			
377.02	3,565	3,040			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 6.531 ac, 54.42% Impervious, Inflow Depth = 6.66" for 100-year event
Inflow = 43.37 cfs @ 12.09 hrs, Volume= 3.625 af
Outflow = 38.02 cfs @ 12.14 hrs, Volume= 3.625 af, Atten= 12%, Lag= 3.0 min
Primary = 20.69 cfs @ 12.14 hrs, Volume= 3.374 af
Secondary = 17.33 cfs @ 12.14 hrs, Volume= 0.251 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 309.36' @ 12.14 hrs Surf.Area= 4,163 sf Storage= 10,806 cf

Plug-Flow detention time= 2.4 min calculated for 3.625 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (781.3 - 778.9)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=20.69 cfs @ 12.14 hrs HW=309.36' (Free Discharge)
↑**1=Culvert** (Inlet Controls 20.69 cfs @ 11.71 fps)

Secondary OutFlow Max=17.27 cfs @ 12.14 hrs HW=309.36' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 17.27 cfs @ 2.27 fps)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 9.015 ac, 55.56% Impervious, Inflow Depth = 6.63" for 100-year event
Inflow = 54.41 cfs @ 12.13 hrs, Volume= 4.980 af
Outflow = 44.57 cfs @ 12.22 hrs, Volume= 4.969 af, Atten= 18%, Lag= 5.4 min
Primary = 40.11 cfs @ 12.22 hrs, Volume= 4.932 af
Secondary = 4.46 cfs @ 12.22 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 315.23' @ 12.22 hrs Surf.Area= 7,877 sf Storage= 12,368 cf

Plug-Flow detention time= 4.7 min calculated for 4.969 af (100% of inflow)
Center-of-Mass det. time= 3.2 min (786.9 - 783.6)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=40.11 cfs @ 12.22 hrs HW=315.23' (Free Discharge)
↑**1=Culvert** (Inlet Controls 40.11 cfs @ 8.17 fps)

Secondary OutFlow Max=4.43 cfs @ 12.22 hrs HW=315.23' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 4.43 cfs @ 1.29 fps)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Link POA-3: POA-3 DMH discharging to 30" D RCP to Hilltop Road

Inflow Area = 32.521 ac, 42.36% Impervious, Inflow Depth = 6.18" for 100-year event
Inflow = 152.93 cfs @ 12.18 hrs, Volume= 16.741 af
Primary = 152.93 cfs @ 12.18 hrs, Volume= 16.741 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 3.329 ac, 2.32% Impervious, Inflow Depth = 5.08" for 100-year event
Inflow = 15.64 cfs @ 12.18 hrs, Volume= 1.409 af
Primary = 15.64 cfs @ 12.18 hrs, Volume= 1.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 4.996 ac, 0.00% Impervious, Inflow Depth = 4.72" for 100-year event
Inflow = 17.73 cfs @ 12.31 hrs, Volume= 1.967 af
Primary = 17.73 cfs @ 12.31 hrs, Volume= 1.967 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.087 ac, 0.00% Impervious, Inflow Depth = 5.69" for 100-year event
Inflow = 11.95 cfs @ 12.14 hrs, Volume= 0.990 af
Primary = 11.95 cfs @ 12.14 hrs, Volume= 0.990 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 1.578 ac, 47.27% Impervious, Inflow Depth = 8.20" for 100-year event
Inflow = 27.14 cfs @ 12.14 hrs, Volume= 1.078 af
Primary = 27.14 cfs @ 12.14 hrs, Volume= 1.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 1.124 ac, 0.00% Impervious, Inflow Depth = 4.75" for 100-year event
Inflow = 4.41 cfs @ 12.25 hrs, Volume= 0.445 af
Primary = 4.41 cfs @ 12.25 hrs, Volume= 0.445 af, Atten= 0%, Lag= 0.0 min

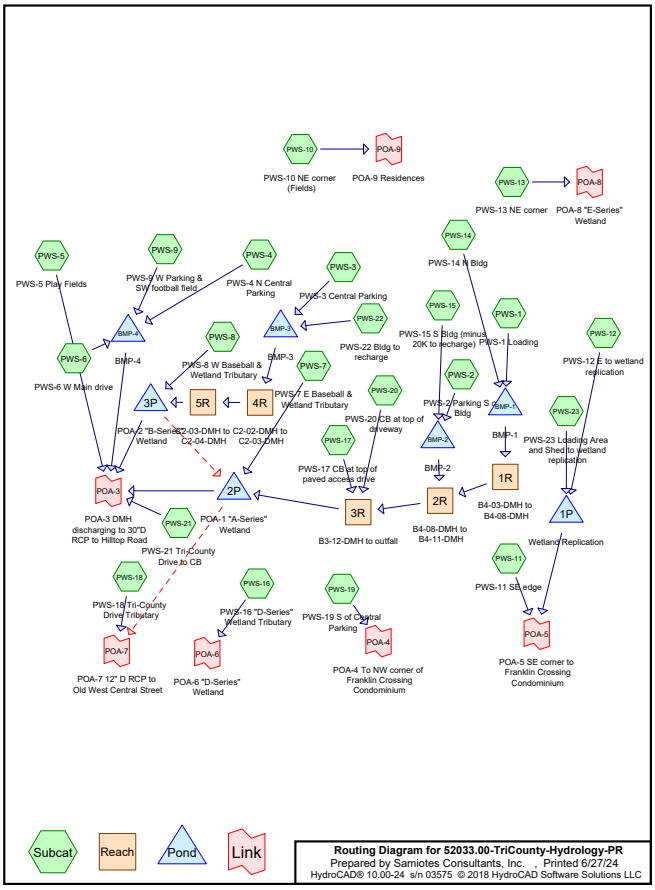
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.181 ac, 0.00% Impervious, Inflow Depth = 4.64" for 100-year event
Inflow = 0.84 cfs @ 12.15 hrs, Volume= 0.070 af
Primary = 0.84 cfs @ 12.15 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

APPENDIX 2:
PROPOSED HYDROLOGICAL CALCULATIONS



Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
19.341	74	>75% Grass cover, Good, HSG C (PWS-1, PWS-11, PWS-12, PWS-13, PWS-17, PWS-19, PWS-20, PWS-23, PWS-3, PWS-4, PWS-5, PWS-6, PWS-7, PWS-8, PWS-9)
0.727	98	>75% Grass cover, Good, HSG C (PWS-2)
0.582	87	Dirt roads, HSG C (PWS-5, PWS-7, PWS-8)
0.128	96	Gravel surface, HSG D (PWS-16)
6.045	98	Paved parking & bldg, HSG C (PWS-3, PWS-4, PWS-5)
0.089	98	Paved parking, HSG A (PWS-18)
5.339	98	Paved parking, HSG C (PWS-1, PWS-17, PWS-2, PWS-20, PWS-21, PWS-23, PWS-6, PWS-7, PWS-8, PWS-9)
1.177	98	Paved parking, HSG D (PWS-18)
3.913	98	Roof, HSG C (PWS-14, PWS-15, PWS-22)
0.141	98	Water Surface, HSG C (PWS-12)
0.099	30	Woods, Good, HSG A (PWS-18)
6.617	70	Woods, Good, HSG C (PWS-10, PWS-11, PWS-12, PWS-13, PWS-19, PWS-5, PWS-7, PWS-8)
2.532	77	Woods, Good, HSG D (PWS-16, PWS-18)
46.730	**83**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.188	HSG A	PWS-18
0.000	HSG B	
42.705	HSG C	PWS-1, PWS-10, PWS-11, PWS-12, PWS-13, PWS-14, PWS-15, PWS-17, PWS-19, PWS-2, PWS-20, PWS-21, PWS-22, PWS-23, PWS-3, PWS-4, PWS-5, PWS-6, PWS-7, PWS-8, PWS-9
3.837	HSG D	PWS-16, PWS-18
0.000	Other	
46.730		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	20.068	0.000	0.000	20.068	>75% Grass cover, Good	PWS-1, PWS-11, PWS-12, PWS-13, PWS-17, PWS-19, PWS-2, PWS-20, PWS-23, PWS-3, PWS-4, PWS-5, PWS-6, PWS-7, PWS-8, PWS-9
0.000	0.000	0.582	0.000	0.000	0.582	Dirt roads	PWS-5, PWS-7, PWS-8
0.000	0.000	0.000	0.128	0.000	0.128	Gravel surface	PWS-16
0.089	0.000	5.339	1.177	0.000	6.605	Paved parking	PWS-1, PWS-17, PWS-18, PWS-2, PWS-20, PWS-21, PWS-23, PWS-6, PWS-7, PWS-8, PWS-9
0.000	0.000	6.045	0.000	0.000	6.045	Paved parking & bldg	PWS-3, PWS-4, PWS-5

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	3.913	0.000	0.000	3.913	Roof	PWS-14, PWS-15, PWS-22
0.000	0.000	0.141	0.000	0.000	0.141	Water Surface	PWS-12
0.099	0.000	6.617	2.532	0.000	9.248	Woods, Good	PWS-10, PWS-11, PWS-12, PWS-13, PWS-16, PWS-18, PWS-19, PWS-5, PWS-7, PWS-8
0.188	**0.000**	**42.705**	**3.837**	**0.000**	**46.730**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	PWS-5	0.00	0.00	780.0	0.0300	0.011	36.0	0.0	0.0
2	1R	369.10	366.71	239.0	0.0100	0.013	18.0	0.0	0.0
3	2R	365.92	360.85	492.0	0.0103	0.013	21.0	0.0	0.0
4	3R	352.30	347.80	130.0	0.0346	0.011	24.0	0.0	0.0
5	4R	355.70	354.25	84.0	0.0173	0.013	15.0	0.0	0.0
6	5R	354.00	348.00	190.0	0.0316	0.013	15.0	0.0	0.0
7	2P	302.70	298.60	89.0	0.0461	0.011	18.0	0.0	0.0
8	3P	311.10	303.80	136.0	0.0537	0.011	30.0	0.0	0.0
9	BMP-1	371.25	369.20	157.0	0.0131	0.013	18.0	0.0	0.0
10	BMP-2	370.00	366.25	71.0	0.0528	0.013	21.0	0.0	0.0
11	BMP-3	356.00	355.82	18.0	0.0100	0.013	15.0	0.0	0.0
12	BMP-4	333.25	332.95	30.0	0.0100	0.013	24.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPWS-1: PWS-1 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=2.32"
Tc=6.0 min CN=90 Runoff=3.72 cfs 0.268 af

SubcatchmentPWS-10: PWS-10 NE corner Runoff Area=6,269 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.12 cfs 0.011 af

SubcatchmentPWS-11: PWS-11 SE edge Runoff Area=15,122 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=50' Slope=0.0540 '/' Tc=8.3 min CN=70 Runoff=0.31 cfs 0.027 af

SubcatchmentPWS-12: PWS-12 E to Runoff Area=69,072 sf 8.92% Impervious Runoff Depth=1.20"
Flow Length=551' Tc=27.0 min CN=75 Runoff=1.28 cfs 0.159 af

SubcatchmentPWS-13: PWS-13 NE corner Runoff Area=39,673 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=184' Tc=12.9 min CN=70 Runoff=0.71 cfs 0.070 af

SubcatchmentPWS-14: PWS-14 N Bldg Runoff Area=110,964 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=8.32 cfs 0.664 af

SubcatchmentPWS-15: PWS-15 S Bldg Runoff Area=39,471 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=2.96 cfs 0.236 af

SubcatchmentPWS-16: PWS-16 "D-Series" Runoff Area=88,172 sf 0.00% Impervious Runoff Depth=1.39"
Flow Length=376' Tc=10.2 min CN=78 Runoff=2.81 cfs 0.235 af

SubcatchmentPWS-17: PWS-17 CB at top Runoff Area=13,715 sf 57.37% Impervious Runoff Depth=2.14"
Tc=6.0 min CN=88 Runoff=0.79 cfs 0.056 af

SubcatchmentPWS-18: PWS-18 Runoff Area=87,171 sf 63.27% Impervious Runoff Depth=2.14"
Flow Length=283' Tc=10.1 min CN=88 Runoff=4.36 cfs 0.357 af

SubcatchmentPWS-19: PWS-19 S of Central Runoff Area=9,970 sf 0.00% Impervious Runoff Depth=1.03"
Flow Length=178' Tc=10.1 min CN=72 Runoff=0.22 cfs 0.020 af

SubcatchmentPWS-2: PWS-2 Parking S Runoff Area=74,942 sf 100.00% Impervious Runoff Depth=3.13"
Flow Length=134' Tc=7.3 min CN=98 Runoff=5.37 cfs 0.448 af

SubcatchmentPWS-20: PWS-20 CB at top Runoff Area=12,926 sf 65.19% Impervious Runoff Depth=2.32"
Tc=6.0 min CN=90 Runoff=0.80 cfs 0.057 af

SubcatchmentPWS-21: PWS-21 Runoff Area=7,624 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=0.57 cfs 0.046 af

SubcatchmentPWS-22: PWS-22 Bldg to Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=1.50 cfs 0.120 af

SubcatchmentPWS-23: PWS-23 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=2.32"
Tc=6.0 min CN=90 Runoff=3.72 cfs 0.268 af

SubcatchmentPWS-3: PWS-3 Central Runoff Area=118,531 sf 76.18% Impervious Runoff Depth=2.50"
Tc=6.0 min CN=92 Runoff=7.78 cfs 0.568 af

SubcatchmentPWS-4: PWS-4 N Central Runoff Area=135,800 sf 51.34% Impervious Runoff Depth=1.97"
Flow Length=156' Tc=11.0 min CN=86 Runoff=6.11 cfs 0.513 af

SubcatchmentPWS-5: PWS-5 Play Fields Runoff Area=646,224 sf 15.98% Impervious Runoff Depth=1.39"
Flow Length=1,344' Tc=14.5 min CN=78 Runoff=18.18 cfs 1.721 af

SubcatchmentPWS-6: PWS-6 W Main drive Runoff Area=38,987 sf 52.87% Impervious Runoff Depth=2.06"
Flow Length=504' Tc=9.5 min CN=87 Runoff=1.91 cfs 0.153 af

SubcatchmentPWS-7: PWS-7 E Baseball Runoff Area=157,633 sf 0.95% Impervious Runoff Depth=1.09"
Flow Length=562' Tc=16.5 min CN=73 Runoff=3.15 cfs 0.328 af

SubcatchmentPWS-8: PWS-8 W Baseball Runoff Area=140,196 sf 4.41% Impervious Runoff Depth=1.14"
Flow Length=248' Tc=11.7 min CN=74 Runoff=3.40 cfs 0.307 af

SubcatchmentPWS-9: PWS-9 W Parking & Runoff Area=82,387 sf 71.65% Impervious Runoff Depth=2.41"
Flow Length=575' Tc=11.0 min CN=91 Runoff=4.45 cfs 0.380 af

Reach 1R: B4-03-DMH to B4-08-DMH Avg. Flow Depth=0.63' Max Vel=5.50 fps Inflow=3.89 cfs 0.931 af
18.0" Round Pipe n=0.013 L=239.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=3.89 cfs 0.931 af

Reach 2R: B4-08-DMH to B4-11-DMH Avg. Flow Depth=0.87' Max Vel=6.66 fps Inflow=7.93 cfs 1.616 af
21.0" Round Pipe n=0.013 L=492.0' S=0.0103 '/' Capacity=16.08 cfs Outflow=7.92 cfs 1.616 af

Reach 3R: B3-12-DMH to outfall Avg. Flow Depth=0.56' Max Vel=11.85 fps Inflow=8.57 cfs 1.729 af
24.0" Round Pipe n=0.011 L=130.0' S=0.0346 '/' Capacity=49.74 cfs Outflow=8.56 cfs 1.729 af

Reach 4R: C2-02-DMH to C2-03-DMH Avg. Flow Depth=0.42' Max Vel=5.74 fps Inflow=2.10 cfs 0.470 af
15.0" Round Pipe n=0.013 L=84.0' S=0.0173 '/' Capacity=8.49 cfs Outflow=2.10 cfs 0.470 af

Reach 5R: C2-03-DMH to C2-04-DMH Avg. Flow Depth=0.36' Max Vel=7.12 fps Inflow=2.10 cfs 0.470 af
15.0" Round Pipe n=0.013 L=190.0' S=0.0316 '/' Capacity=11.48 cfs Outflow=2.10 cfs 0.470 af

Pond 1P: Wetland Replication Peak Elev=377.33' Storage=5,973 cf Inflow=4.17 cfs 0.427 af
Outflow=2.67 cfs 0.304 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=305.22' Storage=984 cf Inflow=11.68 cfs 2.057 af
Primary=11.31 cfs 2.057 af Secondary=0.00 cfs 0.000 af Outflow=11.31 cfs 2.057 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=311.93' Storage=718 cf Inflow=4.46 cfs 0.777 af
Primary=4.45 cfs 0.766 af Secondary=0.00 cfs 0.000 af Outflow=4.45 cfs 0.766 af

Pond BMP-1: BMP-1 Peak Elev=372.81' Storage=12,788 cf Inflow=12.03 cfs 0.931 af
Outflow=3.89 cfs 0.931 af

Pond BMP-2: BMP-2 Peak Elev=371.68' Storage=5,899 cf Inflow=8.30 cfs 0.684 af
Outflow=4.11 cfs 0.684 af

Pond BMP-3: BMP-3 Peak Elev=356.81' Storage=16,064 cf Inflow=9.28 cfs 0.687 af
15.0" Round Culvert n=0.013 L=18.0' S=0.0100 '/' Outflow=2.10 cfs 0.470 af

Pond BMP-4: BMP-4 Peak Elev=334.62' Storage=12,735 cf Inflow=12.44 cfs 1.046 af
24.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=7.70 cfs 0.985 af

Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road Inflow=40.62 cfs 5.574 af
Primary=40.62 cfs 5.574 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=0.22 cfs 0.020 af
Primary=0.22 cfs 0.020 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=2.86 cfs 0.331 af
Primary=2.86 cfs 0.331 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=2.81 cfs 0.235 af
Primary=2.81 cfs 0.235 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=4.36 cfs 0.357 af
Primary=4.36 cfs 0.357 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=0.71 cfs 0.070 af
Primary=0.71 cfs 0.070 af

Link POA-9: POA-9 Residences Inflow=0.12 cfs 0.011 af
Primary=0.12 cfs 0.011 af

Total Runoff Area = 46.730 ac Runoff Volume = 7.009 af Average Runoff Depth = 1.80"
62.70% Pervious = 29.299 ac 37.30% Impervious = 17.431 ac

Summary for Subcatchment PWS-1: PWS-1 Loading

Runoff = 3.72 cfs @ 12.09 hrs, Volume= 0.268 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-10: PWS-10 NE corner (Fields)

Runoff = 0.12 cfs @ 12.17 hrs, Volume= 0.011 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
6,269	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,269	70	Weighted Average
6,269		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS**
					Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-11: PWS-11 SE edge

Runoff = 0.31 cfs @ 12.13 hrs, Volume= 0.027 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
1,211	74	>75% Grass cover, Good, HSG C
13,911	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
15,122	70	Weighted Average
15,122		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0540	0.10		**Sheet Flow, SHEET 50 FT**
					Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-12: PWS-12 E to wetland replication

Runoff = 1.28 cfs @ 12.39 hrs, Volume= 0.159 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
35,208	74	>75% Grass cover, Good, HSG C
27,704	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,160	98	Water Surface, HSG C
69,072	75	Weighted Average
62,912		91.08% Pervious Area
6,160		8.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
14.1	501	0.0140	0.59		**Shallow Concentrated Flow, SCF 258 FT** Woodland Kv= 5.0 fps
27.0	551	Total			

Summary for Subcatchment PWS-13: PWS-13 NE corner

Runoff = 0.71 cfs @ 12.20 hrs, Volume= 0.070 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
3,912	74	>75% Grass cover, Good, HSG C
35,761	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
39,673	70	Weighted Average
39,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
2.4	134	0.0360	0.95		**Shallow Concentrated Flow, SCF 134 FT WOODS** Woodland Kv= 5.0 fps
12.9	184	Total			

Summary for Subcatchment PWS-14: PWS-14 N Bldg

Runoff = 8.32 cfs @ 12.08 hrs, Volume= 0.664 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	110,964	98	Roof, HSG C
	110,964		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-15: PWS-15 S Bldg (minus 20K to recharge)

Runoff = 2.96 cfs @ 12.08 hrs, Volume= 0.236 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	39,471	98	Roof, HSG C
	39,471		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-16: PWS-16 "D-Series" Wetland Tributary

Runoff = 2.81 cfs @ 12.15 hrs, Volume= 0.235 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
82,594	77	Woods, Good, HSG D
5,578	96	Gravel surface, HSG D
88,172	78	Weighted Average
88,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment PWS-17: PWS-17 CB at top of paved access drive

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
7,868	98	Paved parking, HSG C
5,847	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
13,715	88	Weighted Average
5,847		42.63% Pervious Area
7,868		57.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-18: PWS-18 Tri-County Drive Tributary

Runoff = 4.36 cfs @ 12.14 hrs, Volume= 0.357 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
51,279	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
27,700	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
87,171	88	Weighted Average
32,014		36.73% Pervious Area
55,157		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment PWS-19: PWS-19 S of Central Parking

Runoff = 0.22 cfs @ 12.15 hrs, Volume= 0.020 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
6,122	74	>75% Grass cover, Good, HSG C
3,848	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
9,970	72	Weighted Average
9,970		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	128	0.0700	1.32		**Shallow Concentrated Flow, SCF 128 FT** Woodland Kv= 5.0 fps
10.1	178	Total			

Summary for Subcatchment PWS-2: PWS-2 Parking S of Bldg

Runoff = 5.37 cfs @ 12.10 hrs, Volume= 0.448 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
	43,283	98	Paved parking, HSG C
*	31,659	98	>75% Grass cover, Good, HSG C
	74,942	98	Weighted Average
	74,942		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0144	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	33	0.0360	1.33		**Shallow Concentrated Flow, SCF 33 FT** Short Grass Pasture Kv= 7.0 fps
0.5	51	0.0060	1.57		**Shallow Concentrated Flow, SCF 51 FT** Paved Kv= 20.3 fps
7.3	134	Total			

Summary for Subcatchment PWS-20: PWS-20 CB at top of driveway

Runoff = 0.80 cfs @ 12.09 hrs, Volume= 0.057 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
8,427	98	Paved parking, HSG C
4,499	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
12,926	90	Weighted Average
4,499		34.81% Pervious Area
8,427		65.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-21: PWS-21 Tri-County Drive to CB

Runoff = 0.57 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
7,624	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
7,624	98	Weighted Average
7,624		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-22: PWS-22 Bldg to recharge

Runoff = 1.50 cfs @ 12.08 hrs, Volume= 0.120 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	20,000	98	Roof, HSG C
	20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-23: PWS-23 Loading Area and Shed to wetland replication

Runoff = 3.72 cfs @ 12.09 hrs, Volume= 0.268 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-3: PWS-3 Central Parking

Runoff = 7.78 cfs @ 12.09 hrs, Volume= 0.568 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	90,299	98	Paved parking & bldg, HSG C
	28,232	74	>75% Grass cover, Good, HSG C
	118,531	92	Weighted Average
	28,232		23.82% Pervious Area
	90,299		76.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-4: PWS-4 N Central Parking

Runoff = 6.11 cfs @ 12.15 hrs, Volume= 0.513 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	69,719	98	Paved parking & bldg, HSG C
	66,081	74	>75% Grass cover, Good, HSG C
	135,800	86	Weighted Average
	66,081		48.66% Pervious Area
	69,719		51.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	41	0.0480	1.53		**Shallow Concentrated Flow, SCF 41 FT** Short Grass Pasture Kv= 7.0 fps
0.3	65	0.0310	3.57		**Shallow Concentrated Flow, SCF 65 FT** Paved Kv= 20.3 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
11.0	156	Total			

Summary for Subcatchment PWS-5: PWS-5 Play Fields

Runoff = 18.18 cfs @ 12.20 hrs, Volume= 1.721 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

	Area (sf)	CN	Description
*	103,282	98	Paved parking & bldg, HSG C
	463,146	74	>75% Grass cover, Good, HSG C
	65,535	70	Woods, Good, HSG C
	14,261	87	Dirt roads, HSG C
	646,224	78	Weighted Average
	542,942		84.02% Pervious Area
	103,282		15.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0120	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
6.4	514	0.0370	1.35		**Shallow Concentrated Flow, SCF 514 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
14.5	1,344	Total			

Summary for Subcatchment PWS-6: PWS-6 W Main drive

Runoff = 1.91 cfs @ 12.13 hrs, Volume= 0.153 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
20,613	98	Paved parking, HSG C
18,374	74	>75% Grass cover, Good, HSG C
38,987	87	Weighted Average
18,374		47.13% Pervious Area
20,613		52.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	198	0.0680	1.83		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
1.2	256	0.0300	3.52		**Shallow Concentrated Flow, SCF 256 FT** Paved Kv= 20.3 fps
9.5	504	Total			

Summary for Subcatchment PWS-7: PWS-7 E Baseball & Wetland Tributary

Runoff = 3.15 cfs @ 12.24 hrs, Volume= 0.328 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
1,497	98	Paved parking, HSG C
83,000	74	>75% Grass cover, Good, HSG C
67,324	70	Woods, Good, HSG C
5,812	87	Dirt roads, HSG C
157,633	73	Weighted Average
156,136		99.05% Pervious Area
1,497		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
7.3	258	0.0070	0.59		**Shallow Concentrated Flow, SCF 258 FT** Short Grass Pasture Kv= 7.0 fps
2.4	254	0.1230	1.75		**Shallow Concentrated Flow, SCF 254 FT** Woodland Kv= 5.0 fps
0.3					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
16.5	562	Total			

Summary for Subcatchment PWS-8: PWS-8 W Baseball & Wetland Tributary

Runoff = 3.40 cfs @ 12.17 hrs, Volume= 0.307 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
6,188	98	Paved parking, HSG C
60,836	74	>75% Grass cover, Good, HSG C
67,878	70	Woods, Good, HSG C
5,294	87	Dirt roads, HSG C
140,196	74	Weighted Average
134,008		95.59% Pervious Area
6,188		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	198	0.0100	0.70		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
11.7	248	Total			

Summary for Subcatchment PWS-9: PWS-9 W Parking & SW football field

Runoff = 4.45 cfs @ 12.15 hrs, Volume= 0.380 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.36"

Area (sf)	CN	Description
59,027	98	Paved parking, HSG C
23,360	74	>75% Grass cover, Good, HSG C
82,387	91	Weighted Average
23,360		28.35% Pervious Area
59,027		71.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0110	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.9	120	0.1090	2.31		**Shallow Concentrated Flow, SCF 120 FT** Short Grass Pasture Kv= 7.0 fps
3.0	405	0.0120	2.22		**Shallow Concentrated Flow, SCF 405 FT** Paved Kv= 20.3 fps
11.0	575	Total			

Summary for Reach 1R: B4-03-DMH to B4-08-DMH

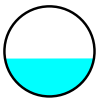
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-1 Primary device # 1 OUTLET by 0.53'

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 2.84" for 2-year event
Inflow = 3.89 cfs @ 12.38 hrs, Volume= 0.931 af
Outflow = 3.89 cfs @ 12.40 hrs, Volume= 0.931 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.50 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.28 fps, Avg. Travel Time= 3.1 min

Peak Storage= 169 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 239.0' Slope= 0.0100 '/'
Inlet Invert= 369.10', Outlet Invert= 366.71'



Stage-Area-Storage for Reach 1R: B4-03-DMH to B4-08-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
369.10	0.0	0	370.14	1.3	312
369.12	0.0	1	370.16	1.3	319
369.14	0.0	3	370.18	1.4	326
369.16	0.0	6	370.20	1.4	332
369.18	0.0	9	370.22	1.4	338
369.20	0.1	12	370.24	1.4	344
369.22	0.1	16	370.26	1.5	350
369.24	0.1	20	370.28	1.5	356
369.26	0.1	24	370.30	1.5	362
369.28	0.1	29	370.32	1.5	368
369.30	0.1	33	370.34	1.6	373
369.32	0.2	38	370.36	1.6	379
369.34	0.2	44	370.38	1.6	384
369.36	0.2	49	370.40	1.6	389
369.38	0.2	54	370.42	1.6	394
369.40	0.3	60	370.44	1.7	398
369.42	0.3	66	370.46	1.7	402
369.44	0.3	72	370.48	1.7	407
369.46	0.3	78	370.50	1.7	410
369.48	0.4	84	370.52	1.7	414
369.50	0.4	90	370.54	1.7	417
369.52	0.4	97	370.56	1.8	419
369.54	0.4	103	370.58	1.8	421
369.56	0.5	110	370.60	**1.8**	**422**
369.58	0.5	117			
369.60	0.5	123			
369.62	0.5	130			
369.64	0.6	137			
369.66	0.6	144			
369.68	0.6	151			
369.70	0.7	158			
369.72	0.7	165			
369.74	0.7	172			
369.76	0.7	179			
369.78	0.8	186			
369.80	0.8	193			
369.82	0.8	200			
369.84	0.9	208			
369.86	0.9	215			
369.88	0.9	222			
369.90	1.0	229			
369.92	1.0	236			
369.94	1.0	243			
369.96	1.0	250			
369.98	1.1	258			
370.00	1.1	265			
370.02	1.1	272			
370.04	1.2	279			
370.06	1.2	285			
370.08	1.2	292			
370.10	1.3	299			
370.12	1.3	306			

Summary for Reach 2R: B4-08-DMH to B4-11-DMH

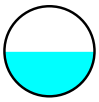
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 1R outlet invert by 0.08' @ 12.32 hrs
[79] Warning: Submerged Pond BMP-2 Primary device # 1 OUTLET by 0.54'

Inflow Area = 6.560 ac, 92.53% Impervious, Inflow Depth = 2.96" for 2-year event
Inflow = 7.93 cfs @ 12.30 hrs, Volume= 1.616 af
Outflow = 7.92 cfs @ 12.34 hrs, Volume= 1.616 af, Atten= 0%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.66 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.47 fps, Avg. Travel Time= 5.6 min

Peak Storage= 585 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.87'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 16.08 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 492.0' Slope= 0.0103 '/'
Inlet Invert= 365.92', Outlet Invert= 360.85'



Stage-Area-Storage for Reach 2R: B4-08-DMH to B4-11-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
365.92	0.0	0	366.96	1.5	733
365.94	0.0	3	366.98	1.5	750
365.96	0.0	7	367.00	1.6	767
365.98	0.0	13	367.02	1.6	783
366.00	0.0	19	367.04	1.6	800
366.02	0.1	27	367.06	1.7	816
366.04	0.1	35	367.08	1.7	833
366.06	0.1	44	367.10	1.7	849
366.08	0.1	54	367.12	1.8	865
366.10	0.1	64	367.14	1.8	881
366.12	0.2	75	367.16	1.8	897
366.14	0.2	86	367.18	1.9	912
366.16	0.2	98	367.20	1.9	928
366.18	0.2	110	367.22	1.9	943
366.20	0.2	122	367.24	1.9	958
366.22	0.3	135	367.26	2.0	972
366.24	0.3	148	367.28	2.0	987
366.26	0.3	162	367.30	2.0	1,001
366.28	0.4	175	367.32	2.1	1,015
366.30	0.4	189	367.34	2.1	1,029
366.32	0.4	204	367.36	2.1	1,042
366.34	0.4	218	367.38	2.1	1,055
366.36	0.5	233	367.40	2.2	1,067
366.38	0.5	248	367.42	2.2	1,080
366.40	0.5	264	367.44	2.2	1,092
366.42	0.6	279	367.46	2.2	1,103
366.44	0.6	295	367.48	2.3	1,114
366.46	0.6	310	367.50	2.3	1,124
366.48	0.7	326	367.52	2.3	1,134
366.50	0.7	343	367.54	2.3	1,144
366.52	0.7	359	367.56	2.3	1,152
366.54	0.8	375	367.58	2.4	1,160
366.56	0.8	392	367.60	2.4	1,168
366.58	0.8	408	367.62	2.4	1,174
366.60	0.9	425	367.64	2.4	1,179
366.62	0.9	442	367.66	**2.4**	**1,182**
366.64	0.9	459			
366.66	1.0	476			
366.68	1.0	493			
366.70	1.0	510			
366.72	1.1	527			
366.74	1.1	544			
366.76	1.1	562			
366.78	1.2	579			
366.80	1.2	596			
366.82	1.2	613			
366.84	1.3	630			
366.86	1.3	648			
366.88	1.4	665			
366.90	1.4	682			
366.92	1.4	699			
366.94	1.5	716			

Summary for Reach 3R: B3-12-DMH to outfall

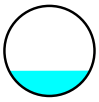
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 7.171 ac, 89.86% Impervious, Inflow Depth = 2.89" for 2-year event
Inflow = 8.57 cfs @ 12.29 hrs, Volume= 1.729 af
Outflow = 8.56 cfs @ 12.30 hrs, Volume= 1.729 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.85 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.68 fps, Avg. Travel Time= 0.8 min

Peak Storage= 94 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 49.74 cfs

24.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 130.0' Slope= 0.0346 '/'
Inlet Invert= 352.30', Outlet Invert= 347.80'



Stage-Area-Storage for Reach 3R: B3-12-DMH to outfall

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
352.30	0.0	0	353.34	1.7	215
352.32	0.0	1	353.36	1.7	220
352.34	0.0	2	353.38	1.7	225
352.36	0.0	4	353.40	1.8	230
352.38	0.0	5	353.42	1.8	235
352.40	0.1	8	353.44	1.8	240
352.42	0.1	10	353.46	1.9	246
352.44	0.1	13	353.48	1.9	251
352.46	0.1	15	353.50	2.0	256
352.48	0.1	18	353.52	2.0	261
352.50	0.2	21	353.54	2.0	266
352.52	0.2	24	353.56	2.1	271
352.54	0.2	28	353.58	2.1	276
352.56	0.2	31	353.60	2.2	281
352.58	0.3	35	353.62	2.2	286
352.60	0.3	38	353.64	2.2	291
352.62	0.3	42	353.66	2.3	296
352.64	0.4	46	353.68	2.3	301
352.66	0.4	50	353.70	2.3	305
352.68	0.4	54	353.72	2.4	310
352.70	0.4	58	353.74	2.4	315
352.72	0.5	62	353.76	2.5	319
352.74	0.5	67	353.78	2.5	324
352.76	0.5	71	353.80	2.5	329
352.78	0.6	75	353.82	2.6	333
352.80	0.6	80	353.84	2.6	337
352.82	0.6	84	353.86	2.6	342
352.84	0.7	89	353.88	2.7	346
352.86	0.7	94	353.90	2.7	350
352.88	0.8	98	353.92	2.7	354
352.90	0.8	103	353.94	2.8	358
352.92	0.8	108	353.96	2.8	362
352.94	0.9	113	353.98	2.8	366
352.96	0.9	118	354.00	2.8	370
352.98	0.9	122	354.02	2.9	374
353.00	1.0	127	354.04	2.9	377
353.02	1.0	132	354.06	2.9	381
353.04	1.1	137	354.08	3.0	384
353.06	1.1	142	354.10	3.0	387
353.08	1.1	147	354.12	3.0	390
353.10	1.2	153	354.14	3.0	393
353.12	1.2	158	354.16	3.0	396
353.14	1.3	163	354.18	3.1	398
353.16	1.3	168	354.20	3.1	401
353.18	1.3	173	354.22	3.1	403
353.20	1.4	178	354.24	3.1	405
353.22	1.4	183	354.26	3.1	406
353.24	1.5	189	354.28	3.1	408
353.26	1.5	194	354.30	**3.1**	**408**
353.28	1.5	199			
353.30	1.6	204			
353.32	1.6	209			

Summary for Reach 4R: C2-02-DMH to C2-03-DMH

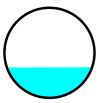
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-3 Primary device # 1 INLET by 0.12'

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth > 1.77" for 2-year event
Inflow = 2.10 cfs @ 12.49 hrs, Volume= 0.470 af
Outflow = 2.10 cfs @ 12.50 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.74 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 1.0 min

Peak Storage= 31 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.49 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 84.0' Slope= 0.0173 '/'
Inlet Invert= 355.70', Outlet Invert= 354.25'



Stage-Area-Storage for Reach 4R: C2-02-DMH to C2-03-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
355.70	0.0	0	356.74	1.1	92
355.72	0.0	0	356.76	1.1	93
355.74	0.0	1	356.78	1.1	95
355.76	0.0	2	356.80	1.1	96
355.78	0.0	3	356.82	1.2	97
355.80	0.0	4	356.84	1.2	99
355.82	0.1	5	356.86	1.2	100
355.84	0.1	6	356.88	1.2	101
355.86	0.1	8	356.90	1.2	102
355.88	0.1	9	356.92	1.2	102
355.90	0.1	11	356.94	**1.2**	**103**
355.92	0.1	12			
355.94	0.2	14			
355.96	0.2	16			
355.98	0.2	17			
356.00	0.2	19			
356.02	0.2	21			
356.04	0.3	23			
356.06	0.3	25			
356.08	0.3	26			
356.10	0.3	28			
356.12	0.4	30			
356.14	0.4	32			
356.16	0.4	34			
356.18	0.4	36			
356.20	0.5	39			
356.22	0.5	41			
356.24	0.5	43			
356.26	0.5	45			
356.28	0.6	47			
356.30	0.6	49			
356.32	0.6	51			
356.34	0.6	53			
356.36	0.7	55			
356.38	0.7	57			
356.40	0.7	59			
356.42	0.7	61			
356.44	0.8	64			
356.46	0.8	66			
356.48	0.8	68			
356.50	0.8	70			
356.52	0.9	72			
356.54	0.9	74			
356.56	0.9	76			
356.58	0.9	78			
356.60	0.9	79			
356.62	1.0	81			
356.64	1.0	83			
356.66	1.0	85			
356.68	1.0	87			
356.70	1.1	88			
356.72	1.1	90			

Summary for Reach 5R: C2-03-DMH to C2-04-DMH

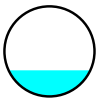
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 4R outlet invert by 0.11' @ 12.50 hrs

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth > 1.77" for 2-year event
Inflow = 2.10 cfs @ 12.50 hrs, Volume= 0.470 af
Outflow = 2.10 cfs @ 12.51 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.12 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 1.8 min

Peak Storage= 56 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 11.48 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 190.0' Slope= 0.0316 '/'
Inlet Invert= 354.00', Outlet Invert= 348.00'



Stage-Area-Storage for Reach 5R: C2-03-DMH to C2-04-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
354.00	0.0	0	355.04	1.1	207
354.02	0.0	1	355.06	1.1	211
354.04	0.0	2	355.08	1.1	214
354.06	0.0	4	355.10	1.1	217
354.08	0.0	6	355.12	1.2	220
354.10	0.0	9	355.14	1.2	223
354.12	0.1	11	355.16	1.2	226
354.14	0.1	14	355.18	1.2	228
354.16	0.1	17	355.20	1.2	230
354.18	0.1	21	355.22	1.2	232
354.20	0.1	24	355.24	**1.2**	**233**
354.22	0.1	28			
354.24	0.2	31			
354.26	0.2	35			
354.28	0.2	39			
354.30	0.2	43			
354.32	0.2	47			
354.34	0.3	51			
354.36	0.3	56			
354.38	0.3	60			
354.40	0.3	64			
354.42	0.4	69			
354.44	0.4	73			
354.46	0.4	78			
354.48	0.4	82			
354.50	0.5	87			
354.52	0.5	92			
354.54	0.5	96			
354.56	0.5	101			
354.58	0.6	106			
354.60	0.6	111			
354.62	0.6	115			
354.64	0.6	120			
354.66	0.7	125			
354.68	0.7	130			
354.70	0.7	134			
354.72	0.7	139			
354.74	0.8	144			
354.76	0.8	148			
354.78	0.8	153			
354.80	0.8	158			
354.82	0.9	162			
354.84	0.9	167			
354.86	0.9	171			
354.88	0.9	175			
354.90	0.9	180			
354.92	1.0	184			
354.94	1.0	188			
354.96	1.0	192			
354.98	1.0	196			
355.00	1.1	200			
355.02	1.1	204			

Summary for Pond 1P: Wetland Replication

Inflow Area = 2.971 ac, 34.91% Impervious, Inflow Depth = 1.72" for 2-year event
Inflow = 4.17 cfs @ 12.09 hrs, Volume= 0.427 af
Outflow = 2.67 cfs @ 12.32 hrs, Volume= 0.304 af, Atten= 36%, Lag= 13.9 min
Primary = 2.67 cfs @ 12.32 hrs, Volume= 0.304 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.33' @ 12.32 hrs Surf.Area= 8,377 sf Storage= 5,973 cf

Plug-Flow detention time= 162.1 min calculated for 0.304 af (71% of inflow)
Center-of-Mass det. time= 65.2 min (896.4 - 831.2)

Volume	Invert	Avail.Storage	Storage Description
#1	376.50'	7,475 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.50	6,160	400.0	0	0	6,160
377.00	7,440	495.0	3,395	3,395	12,930
377.50	8,900	515.0	4,080	7,475	14,557

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.67 cfs @ 12.32 hrs HW=377.33' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 2.67 cfs @ 0.70 fps)

Stage-Area-Storage for Pond 1P: Wetland Replication

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.50	6,160	0	377.02	7,496	3,544
376.51	6,184	62	377.03	7,524	3,619
376.52	6,209	124	377.04	7,552	3,695
376.53	6,233	186	377.05	7,580	3,770
376.54	6,258	248	377.06	7,608	3,846
376.55	6,283	311	377.07	7,637	3,923
376.56	6,307	374	377.08	7,665	3,999
376.57	6,332	437	377.09	7,693	4,076
376.58	6,357	501	377.10	7,722	4,153
376.59	6,381	564	377.11	7,750	4,230
376.60	6,406	628	377.12	7,778	4,308
376.61	6,431	692	377.13	7,807	4,386
376.62	6,456	757	377.14	7,836	4,464
376.63	6,481	822	377.15	7,864	4,543
376.64	6,506	887	377.16	7,893	4,621
376.65	6,531	952	377.17	7,922	4,701
376.66	6,556	1,017	377.18	7,951	4,780
376.67	6,582	1,083	377.19	7,979	4,860
376.68	6,607	1,149	377.20	8,008	4,939
376.69	6,632	1,215	377.21	8,037	5,020
376.70	6,658	1,281	377.22	8,066	5,100
376.71	6,683	1,348	377.23	8,095	5,181
376.72	6,708	1,415	377.24	8,124	5,262
376.73	6,734	1,482	377.25	8,154	5,343
376.74	6,759	1,550	377.26	8,183	5,425
376.75	6,785	1,617	377.27	8,212	5,507
376.76	6,811	1,685	377.28	8,241	5,589
376.77	6,836	1,754	377.29	8,271	5,672
376.78	6,862	1,822	377.30	8,300	5,755
376.79	6,888	1,891	377.31	8,330	5,838
376.80	6,914	1,960	377.32	8,359	5,921
376.81	6,939	2,029	377.33	8,389	6,005
376.82	6,965	2,099	377.34	8,419	6,089
376.83	6,991	2,169	377.35	8,448	6,174
376.84	7,017	2,239	377.36	8,478	6,258
376.85	7,043	2,309	377.37	8,508	6,343
376.86	7,069	2,379	377.38	8,538	6,428
376.87	7,096	2,450	377.39	8,568	6,514
376.88	7,122	2,521	377.40	8,598	6,600
376.89	7,148	2,593	377.41	8,628	6,686
376.90	7,174	2,664	377.42	8,658	6,772
376.91	7,201	2,736	377.43	8,688	6,859
376.92	7,227	2,808	377.44	8,718	6,946
376.93	7,254	2,881	377.45	8,748	7,033
376.94	7,280	2,953	377.46	8,778	7,121
376.95	7,307	3,026	377.47	8,809	7,209
376.96	7,333	3,100	377.48	8,839	7,297
376.97	7,360	3,173	377.49	8,870	7,386
376.98	7,386	3,247	377.50	**8,900**	**7,475**
376.99	7,413	3,321			
377.00	7,440	3,395			
377.01	7,468	3,470			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 10.790 ac, 60.04% Impervious, Inflow Depth = 2.29" for 2-year event
Inflow = 11.68 cfs @ 12.26 hrs, Volume= 2.057 af
Outflow = 11.31 cfs @ 12.34 hrs, Volume= 2.057 af, Atten= 3%, Lag= 5.0 min
Primary = 11.31 cfs @ 12.34 hrs, Volume= 2.057 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 305.22' @ 12.34 hrs Surf.Area= 1,067 sf Storage= 984 cf

Plug-Flow detention time= 0.8 min calculated for 2.057 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (844.6 - 843.8)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=11.31 cfs @ 12.34 hrs HW=305.22' (Free Discharge)
↑**1=Culvert** (Inlet Controls 11.31 cfs @ 6.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.70' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 6.399 ac, 41.79% Impervious, Inflow Depth > 1.46" for 2-year event
Inflow = 4.46 cfs @ 12.21 hrs, Volume= 0.777 af
Outflow = 4.45 cfs @ 12.22 hrs, Volume= 0.766 af, Atten= 0%, Lag= 0.6 min
Primary = 4.45 cfs @ 12.22 hrs, Volume= 0.766 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 311.93' @ 12.22 hrs Surf.Area= 320 sf Storage= 718 cf

Plug-Flow detention time= 26.7 min calculated for 0.766 af (99% of inflow)
Center-of-Mass det. time= 5.4 min (935.9 - 930.5)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.44 cfs @ 12.22 hrs HW=311.93' (Free Discharge)
↑**1=Culvert** (Inlet Controls 4.44 cfs @ 3.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Pond BMP-1: BMP-1

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 2.84" for 2-year event
Inflow = 12.03 cfs @ 12.08 hrs, Volume= 0.931 af
Outflow = 3.89 cfs @ 12.38 hrs, Volume= 0.931 af, Atten= 68%, Lag= 17.7 min
Primary = 3.89 cfs @ 12.38 hrs, Volume= 0.931 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 372.81' @ 12.38 hrs Surf.Area= 9,552 sf Storage= 12,788 cf

Plug-Flow detention time= 92.8 min calculated for 0.931 af (100% of inflow)
Center-of-Mass det. time= 92.6 min (862.3 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	371.25'	0 cf	**48.27'W x 197.88'L x 4.67'H Field A** 44,574 cf Overall - 44,574 cf Embedded = 0 cf x 40.0% Voids
#2A	371.25'	32,781 cf	**StormTrap ST1 SingleTrap 4-0** x 98 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 98 Chambers in 7 Rows 48.27' x 196.88' Core + 0.00' x 0.50' Border = 48.27' x 197.88' System
		32,781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	371.25'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 371.25' / 369.20' S= 0.0131 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	371.25'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	374.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.89 cfs @ 12.38 hrs HW=372.81' (Free Discharge)
└**1=Culvert** (Passes 3.89 cfs of 7.66 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 3.89 cfs @ 4.96 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BMP-1: BMP-1 - Chamber Wizard Field A

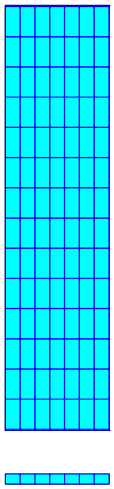
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

14 Chambers/Row x 14.06' Long = 196.88' Row Length +6.0" Border x 2 = 197.88' Base Length
7 Rows x 82.7" Wide = 48.27' Base Width
56.0" Chamber Height = 4.67' Field Height

98 Chambers x 334.5 cf = 32,781.1 cf Chamber Storage
98 Chambers x 452.5 cf + 225.3 cf Border = 44,574.1 cf Displacement

Chamber Storage = 32,781.1 cf = 0.753 af
Overall Storage Efficiency = 73.5%
Overall System Size = 197.88' x 48.27' x 4.67'

98 Chambers (plus border)
1,650.9 cy Field



Stage-Area-Storage for Pond BMP-1: BMP-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
371.25	0	373.85	21,308
371.30	410	373.90	21,718
371.35	820	373.95	22,127
371.40	1,229	374.00	22,537
371.45	1,639	374.05	22,947
371.50	2,049	374.10	23,357
371.55	2,459	374.15	23,766
371.60	2,868	374.20	24,176
371.65	3,278	374.25	24,586
371.70	3,688	374.30	24,996
371.75	4,098	374.35	25,405
371.80	4,507	374.40	25,815
371.85	4,917	374.45	26,225
371.90	5,327	374.50	26,635
371.95	5,737	374.55	27,044
372.00	6,146	374.60	27,454
372.05	6,556	374.65	27,864
372.10	6,966	374.70	28,274
372.15	7,376	374.75	28,683
372.20	7,786	374.80	29,093
372.25	8,195	374.85	29,503
372.30	8,605	374.90	29,913
372.35	9,015	374.95	30,323
372.40	9,425	375.00	30,732
372.45	9,834	375.05	31,142
372.50	10,244	375.10	31,552
372.55	10,654	375.15	31,962
372.60	11,064	375.20	32,371
372.65	11,473	375.25	32,781
372.70	11,883	375.30	32,781
372.75	12,293	375.35	32,781
372.80	12,703	375.40	32,781
372.85	13,112	375.45	32,781
372.90	13,522	375.50	32,781
372.95	13,932	375.55	32,781
373.00	14,342	375.60	32,781
373.05	14,752	375.65	32,781
373.10	15,161	375.70	32,781
373.15	15,571	375.75	32,781
373.20	15,981	375.80	32,781
373.25	16,391	375.85	32,781
373.30	16,800	375.90	**32,781**
373.35	17,210		
373.40	17,620		
373.45	18,030		
373.50	18,439		
373.55	18,849		
373.60	19,259		
373.65	19,669		
373.70	20,078		
373.75	20,488		
373.80	20,898		

Summary for Pond BMP-2: BMP-2

Inflow Area = 2.627 ac,100.00% Impervious, Inflow Depth = 3.13" for 2-year event
Inflow = 8.30 cfs @ 12.09 hrs, Volume= 0.684 af
Outflow = 4.11 cfs @ 12.25 hrs, Volume= 0.684 af, Atten= 51%, Lag= 9.6 min
Primary = 4.11 cfs @ 12.25 hrs, Volume= 0.684 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 371.68' @ 12.25 hrs Surf.Area= 4,114 sf Storage= 5,899 cf

Plug-Flow detention time= 43.0 min calculated for 0.684 af (100% of inflow)
Center-of-Mass det. time= 43.2 min (799.4 - 756.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	0 cf	**41.38'W x 99.44'L x 4.67'H Field A** 19,200 cf Overall - 19,200 cf Embedded = 0 cf x 40.0% Voids
#2A	370.00'	14,049 cf	**StormTrap ST1 SingleTrap 4-0** x 42 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 42 Chambers in 6 Rows 41.38' x 98.44' Core + 0.00' x 0.50' Border = 41.38' x 99.44' System
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	370.00'	**21.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.00' / 366.25' S= 0.0528 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	370.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	373.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.11 cfs @ 12.25 hrs HW=371.68' (Free Discharge)
└**1=Culvert** (Passes 4.11 cfs of 10.47 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 4.11 cfs @ 5.23 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BMP-2: BMP-2 - Chamber Wizard Field A

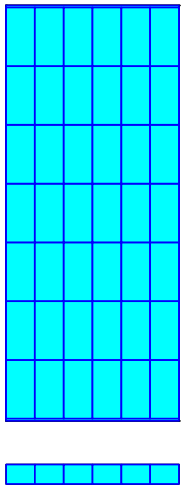
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

7 Chambers/Row x 14.06' Long = 98.44' Row Length +6.0" Border x 2 = 99.44' Base Length
6 Rows x 82.7" Wide = 41.38' Base Width
56.0" Chamber Height = 4.67' Field Height

42 Chambers x 334.5 cf = 14,049.1 cf Chamber Storage
42 Chambers x 452.5 cf + 193.1 cf Border = 19,199.7 cf Displacement

Chamber Storage = 14,049.1 cf = 0.323 af
Overall Storage Efficiency = 73.2%
Overall System Size = 99.44' x 41.38' x 4.67'

42 Chambers (plus border)
711.1 cy Field



Stage-Area-Storage for Pond BMP-2: BMP-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
370.00	0	372.60	9,132
370.05	176	372.65	9,308
370.10	351	372.70	9,483
370.15	527	372.75	9,659
370.20	702	372.80	9,834
370.25	878	372.85	10,010
370.30	1,054	372.90	10,186
370.35	1,229	372.95	10,361
370.40	1,405	373.00	10,537
370.45	1,581	373.05	10,712
370.50	1,756	373.10	10,888
370.55	1,932	373.15	11,064
370.60	2,107	373.20	11,239
370.65	2,283	373.25	11,415
370.70	2,459	373.30	11,590
370.75	2,634	373.35	11,766
370.80	2,810	373.40	11,942
370.85	2,985	373.45	12,117
370.90	3,161	373.50	12,293
370.95	3,337	373.55	12,469
371.00	3,512	373.60	12,644
371.05	3,688	373.65	12,820
371.10	3,863	373.70	12,995
371.15	4,039	373.75	13,171
371.20	4,215	373.80	13,347
371.25	4,390	373.85	13,522
371.30	4,566	373.90	13,698
371.35	4,742	373.95	13,873
371.40	4,917	374.00	14,049
371.45	5,093	374.05	14,049
371.50	5,268	374.10	14,049
371.55	5,444	374.15	14,049
371.60	5,620	374.20	14,049
371.65	5,795	374.25	14,049
371.70	5,971	374.30	14,049
371.75	6,146	374.35	14,049
371.80	6,322	374.40	14,049
371.85	6,498	374.45	14,049
371.90	6,673	374.50	14,049
371.95	6,849	374.55	14,049
372.00	7,025	374.60	14,049
372.05	7,200	374.65	**14,049**
372.10	7,376		
372.15	7,551		
372.20	7,727		
372.25	7,903		
372.30	8,078		
372.35	8,254		
372.40	8,429		
372.45	8,605		
372.50	8,781		
372.55	8,956		

Summary for Pond BMP-3: BMP-3

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 2.59" for 2-year event
Inflow = 9.28 cfs @ 12.09 hrs, Volume= 0.687 af
Outflow = 2.10 cfs @ 12.49 hrs, Volume= 0.470 af, Atten= 77%, Lag= 24.2 min
Primary = 2.10 cfs @ 12.49 hrs, Volume= 0.470 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 356.81' @ 12.49 hrs Surf.Area= 9,995 sf Storage= 16,064 cf

Plug-Flow detention time= 278.0 min calculated for 0.470 af (68% of inflow)
Center-of-Mass det. time= 183.0 min (972.0 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	354.50'	13,801 cf	**58.58'W x 170.61'L x 5.50'H Field A** 54,972 cf Overall - 20,470 cf Embedded = 34,502 cf x 40.0% Voids
#2A	355.25'	20,470 cf	**ADS_StormTech MC-3500 d +Cap** x 184 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 184 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		34,271 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	356.00'	**15.0" Round Culvert** L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 356.00' / 355.82' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.10 cfs @ 12.49 hrs HW=356.81' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.10 cfs @ 3.57 fps)

Pond BMP-3: BMP-3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

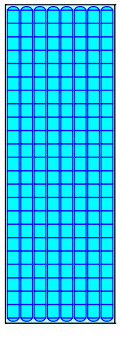
23 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 168.61' Row Length +12.0" End Stone x 2 = 170.61' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

184 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 20,469.6 cf Chamber Storage

54,972.0 cf Field - 20,469.6 cf Chambers = 34,502.4 cf Stone x 40.0% Voids = 13,801.0 cf Stone Storage

Chamber Storage + Stone Storage = 34,270.5 cf = 0.787 af
Overall Storage Efficiency = 62.3%
Overall System Size = 170.61' x 58.58' x 5.50'

184 Chambers
2,036.0 cy Field
1,277.9 cy Stone



Stage-Area-Storage for Pond BMP-3: BMP-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
354.50	0	356.58	14,233	358.66	28,798
354.54	160	356.62	14,557	358.70	28,985
354.58	320	356.66	14,881	358.74	29,168
354.62	480	356.70	15,203	358.78	29,346
354.66	640	356.74	15,524	358.82	29,521
354.70	800	356.78	15,844	358.86	29,693
354.74	960	356.82	16,163	358.90	29,863
354.78	1,119	356.86	16,480	358.94	30,029
354.82	1,279	356.90	16,797	358.98	30,192
354.86	1,439	356.94	17,112	359.02	30,353
354.90	1,599	356.98	17,426	359.06	30,512
354.94	1,759	357.02	17,739	359.10	30,672
354.98	1,919	357.06	18,050	359.14	30,832
355.02	2,079	357.10	18,361	359.18	30,992
355.06	2,239	357.14	18,669	359.22	31,152
355.10	2,399	357.18	18,977	359.26	31,312
355.14	2,559	357.22	19,283	359.30	31,472
355.18	2,719	357.26	19,587	359.34	31,632
355.22	2,879	357.30	19,890	359.38	31,792
355.26	3,085	357.34	20,191	359.42	31,952
355.30	3,433	357.38	20,491	359.46	32,112
355.34	3,780	357.42	20,789	359.50	32,272
355.38	4,127	357.46	21,085	359.54	32,431
355.42	4,473	357.50	21,380	359.58	32,591
355.46	4,819	357.54	21,673	359.62	32,751
355.50	5,164	357.58	21,964	359.66	32,911
355.54	5,508	357.62	22,253	359.70	33,071
355.58	5,852	357.66	22,540	359.74	33,231
355.62	6,196	357.70	22,825	359.78	33,391
355.66	6,538	357.74	23,108	359.82	33,551
355.70	6,881	357.78	23,389	359.86	33,711
355.74	7,222	357.82	23,667	359.90	33,871
355.78	7,563	357.86	23,944	359.94	34,031
355.82	7,904	357.90	24,218	359.98	**34,191**
355.86	8,244	357.94	24,490		
355.90	8,583	357.98	24,759		
355.94	8,921	358.02	25,025		
355.98	9,259	358.06	25,289		
356.02	9,596	358.10	25,550		
356.06	9,933	358.14	25,808		
356.10	10,269	358.18	26,064		
356.14	10,603	358.22	26,316		
356.18	10,938	358.26	26,564		
356.22	11,271	358.30	26,809		
356.26	11,604	358.34	27,051		
356.30	11,935	358.38	27,288		
356.34	12,266	358.42	27,522		
356.38	12,596	358.46	27,750		
356.42	12,925	358.50	27,973		
356.46	13,254	358.54	28,191		
356.50	13,581	358.58	28,401		
356.54	13,908	358.62	28,603		

Summary for Pond BMP-4: BMP-4

Inflow Area = 5.904 ac, 58.08% Impervious, Inflow Depth = 2.13" for 2-year event
Inflow = 12.44 cfs @ 12.15 hrs, Volume= 1.046 af
Outflow = 7.70 cfs @ 12.31 hrs, Volume= 0.985 af, Atten= 38%, Lag= 9.8 min
Primary = 7.70 cfs @ 12.31 hrs, Volume= 0.985 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 334.62' @ 12.31 hrs Surf.Area= 8,735 sf Storage= 12,735 cf

Plug-Flow detention time= 101.8 min calculated for 0.985 af (94% of inflow)
Center-of-Mass det. time= 70.7 min (887.9 - 817.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	332.50'	12,084 cf	**58.58'W x 149.10'L x 5.50'H Field A** 48,041 cf Overall - 17,831 cf Embedded = 30,211 cf x 40.0% Voids
#2A	333.25'	17,831 cf	**ADS_StormTech MC-3500 d +Cap** x 160 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 160 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		29,915 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	333.25'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 333.25' / 332.95' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.69 cfs @ 12.31 hrs HW=334.62' (Free Discharge)
↑**1=Culvert** (Barrel Controls 7.69 cfs @ 4.71 fps)

Pond BMP-4: BMP-4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

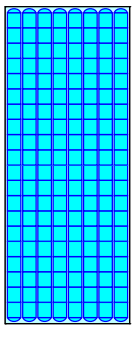
20 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 147.10' Row Length +12.0" End Stone x 2 = 149.10' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

160 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 17,830.7 cf Chamber Storage

48,041.3 cf Field - 17,830.7 cf Chambers = 30,210.6 cf Stone x 40.0% Voids = 12,084.2 cf Stone Storage

Chamber Storage + Stone Storage = 29,914.9 cf = 0.687 af
Overall Storage Efficiency = 62.3%
Overall System Size = 149.10' x 58.58' x 5.50'

160 Chambers
1,779.3 cy Field
1,118.9 cy Stone



Stage-Area-Storage for Pond BMP-4: BMP-4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
332.50	0	334.58	12,422	336.66	25,132
332.54	140	334.62	12,705	336.70	25,296
332.58	280	334.66	12,987	336.74	25,456
332.62	419	334.70	13,268	336.78	25,611
332.66	559	334.74	13,548	336.82	25,764
332.70	699	334.78	13,827	336.86	25,915
332.74	839	334.82	14,105	336.90	26,063
332.78	978	334.86	14,383	336.94	26,208
332.82	1,118	334.90	14,659	336.98	26,351
332.86	1,258	334.94	14,934	337.02	26,491
332.90	1,398	334.98	15,208	337.06	26,631
332.94	1,537	335.02	15,481	337.10	26,770
332.98	1,677	335.06	15,752	337.14	26,910
333.02	1,817	335.10	16,023	337.18	27,050
333.06	1,957	335.14	16,293	337.22	27,190
333.10	2,096	335.18	16,561	337.26	27,329
333.14	2,236	335.22	16,828	337.30	27,469
333.18	2,376	335.26	17,093	337.34	27,609
333.22	2,516	335.30	17,358	337.38	27,749
333.26	2,696	335.34	17,621	337.42	27,888
333.30	3,000	335.38	17,882	337.46	28,028
333.34	3,303	335.42	18,142	337.50	28,168
333.38	3,605	335.46	18,401	337.54	28,308
333.42	3,907	335.50	18,658	337.58	28,447
333.46	4,208	335.54	18,913	337.62	28,587
333.50	4,509	335.58	19,167	337.66	28,727
333.54	4,810	335.62	19,419	337.70	28,867
333.58	5,110	335.66	19,670	337.74	29,007
333.62	5,410	335.70	19,919	337.78	29,146
333.66	5,709	335.74	20,166	337.82	29,286
333.70	6,007	335.78	20,411	337.86	29,426
333.74	6,305	335.82	20,654	337.90	29,566
333.78	6,603	335.86	20,895	337.94	29,705
333.82	6,900	335.90	21,134	337.98	**29,845**
333.86	7,196	335.94	21,372		
333.90	7,492	335.98	21,607		
333.94	7,788	336.02	21,839		
333.98	8,082	336.06	22,069		
334.02	8,377	336.10	22,297		
334.06	8,670	336.14	22,523		
334.10	8,963	336.18	22,745		
334.14	9,255	336.22	22,965		
334.18	9,547	336.26	23,182		
334.22	9,838	336.30	23,396		
334.26	10,128	336.34	23,607		
334.30	10,417	336.38	23,815		
334.34	10,706	336.42	24,018		
334.38	10,994	336.46	24,218		
334.42	11,281	336.50	24,413		
334.46	11,567	336.54	24,602		
334.50	11,853	336.58	24,786		
334.54	12,138	336.62	24,963		

Summary for Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road

Inflow Area = 38.103 ac, 39.70% Impervious, Inflow Depth = 1.76" for 2-year event
Inflow = 40.62 cfs @ 12.23 hrs, Volume= 5.574 af
Primary = 40.62 cfs @ 12.23 hrs, Volume= 5.574 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth = 1.03" for 2-year event
Inflow = 0.22 cfs @ 12.15 hrs, Volume= 0.020 af
Primary = 0.22 cfs @ 12.15 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 3.319 ac, 31.26% Impervious, Inflow Depth = 1.20" for 2-year event
Inflow = 2.86 cfs @ 12.31 hrs, Volume= 0.331 af
Primary = 2.86 cfs @ 12.31 hrs, Volume= 0.331 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.024 ac, 0.00% Impervious, Inflow Depth = 1.39" for 2-year event
Inflow = 2.81 cfs @ 12.15 hrs, Volume= 0.235 af
Primary = 2.81 cfs @ 12.15 hrs, Volume= 0.235 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 2.001 ac, 63.27% Impervious, Inflow Depth = 2.14" for 2-year event
Inflow = 4.36 cfs @ 12.14 hrs, Volume= 0.357 af
Primary = 4.36 cfs @ 12.14 hrs, Volume= 0.357 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 0.911 ac, 0.00% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.71 cfs @ 12.20 hrs, Volume= 0.070 af
Primary = 0.71 cfs @ 12.20 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.144 ac, 0.00% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.12 cfs @ 12.17 hrs, Volume= 0.011 af
Primary = 0.12 cfs @ 12.17 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: PWS-1 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=4.10"
Tc=6.0 min CN=90 Runoff=6.40 cfs 0.473 af

Subcatchment PWS-10: PWS-10 NE corner Runoff Area=6,269 sf 0.00% Impervious Runoff Depth=2.21"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.31 cfs 0.026 af

Subcatchment PWS-11: PWS-11 SE edge Runoff Area=15,122 sf 0.00% Impervious Runoff Depth=2.21"
Flow Length=50' Slope=0.0540 '/' Tc=8.3 min CN=70 Runoff=0.82 cfs 0.064 af

Subcatchment PWS-12: PWS-12 E to Runoff Area=69,072 sf 8.92% Impervious Runoff Depth=2.64"
Flow Length=551' Tc=27.0 min CN=75 Runoff=2.90 cfs 0.348 af

Subcatchment PWS-13: PWS-13 NE corner Runoff Area=39,673 sf 0.00% Impervious Runoff Depth=2.21"
Flow Length=184' Tc=12.9 min CN=70 Runoff=1.85 cfs 0.168 af

Subcatchment PWS-14: PWS-14 N Bldg Runoff Area=110,964 sf 100.00% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=98 Runoff=13.04 cfs 1.060 af

Subcatchment PWS-15: PWS-15 S Bldg Runoff Area=39,471 sf 100.00% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=98 Runoff=4.64 cfs 0.377 af

Subcatchment PWS-16: PWS-16 "D-Series" Runoff Area=88,172 sf 0.00% Impervious Runoff Depth=2.91"
Flow Length=376' Tc=10.2 min CN=78 Runoff=5.99 cfs 0.491 af

Subcatchment PWS-17: PWS-17 CB at top Runoff Area=13,715 sf 57.37% Impervious Runoff Depth=3.89"
Tc=6.0 min CN=88 Runoff=1.40 cfs 0.102 af

Subcatchment PWS-18: PWS-18 Runoff Area=87,171 sf 63.27% Impervious Runoff Depth=3.89"
Flow Length=283' Tc=10.1 min CN=88 Runoff=7.76 cfs 0.648 af

Subcatchment PWS-19: PWS-19 S of Central Runoff Area=9,970 sf 0.00% Impervious Runoff Depth=2.38"
Flow Length=178' Tc=10.1 min CN=72 Runoff=0.55 cfs 0.045 af

Subcatchment PWS-2: PWS-2 Parking S Runoff Area=74,942 sf 100.00% Impervious Runoff Depth=4.99"
Flow Length=134' Tc=7.3 min CN=98 Runoff=8.43 cfs 0.716 af

Subcatchment PWS-20: PWS-20 CB at top Runoff Area=12,926 sf 65.19% Impervious Runoff Depth=4.10"
Tc=6.0 min CN=90 Runoff=1.37 cfs 0.101 af

Subcatchment PWS-21: PWS-21 Runoff Area=7,624 sf 100.00% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=98 Runoff=0.90 cfs 0.073 af

Subcatchment PWS-22: PWS-22 Bldg to Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=98 Runoff=2.35 cfs 0.191 af

Subcatchment PWS-23: PWS-23 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=4.10"
Tc=6.0 min CN=90 Runoff=6.40 cfs 0.473 af

SubcatchmentPWS-3: PWS-3 Central Runoff Area=118,531 sf 76.18% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=92 Runoff=13.02 cfs 0.978 af

SubcatchmentPWS-4: PWS-4 N Central Runoff Area=135,800 sf 51.34% Impervious Runoff Depth=3.68"
Flow Length=156' Tc=11.0 min CN=86 Runoff=11.23 cfs 0.957 af

SubcatchmentPWS-5: PWS-5 Play Fields Runoff Area=646,224 sf 15.98% Impervious Runoff Depth=2.91"
Flow Length=1,344' Tc=14.5 min CN=78 Runoff=38.81 cfs 3.595 af

SubcatchmentPWS-6: PWS-6 W Main drive Runoff Area=38,987 sf 52.87% Impervious Runoff Depth=3.78"
Flow Length=504' Tc=9.5 min CN=87 Runoff=3.46 cfs 0.282 af

SubcatchmentPWS-7: PWS-7 E Baseball Runoff Area=157,633 sf 0.95% Impervious Runoff Depth=2.46"
Flow Length=562' Tc=16.5 min CN=73 Runoff=7.57 cfs 0.743 af

SubcatchmentPWS-8: PWS-8 W Baseball Runoff Area=140,196 sf 4.41% Impervious Runoff Depth=2.55"
Flow Length=248' Tc=11.7 min CN=74 Runoff=7.94 cfs 0.684 af

SubcatchmentPWS-9: PWS-9 W Parking & Runoff Area=82,387 sf 71.65% Impervious Runoff Depth=4.21"
Flow Length=575' Tc=11.0 min CN=91 Runoff=7.56 cfs 0.663 af

Reach 1R: B4-03-DMH to B4-08-DMH Avg. Flow Depth=0.76' Max Vel=5.99 fps Inflow=5.42 cfs 1.533 af
18.0" Round Pipe n=0.013 L=239.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=5.42 cfs 1.533 af

Reach 2R: B4-08-DMH to B4-11-DMH Avg. Flow Depth=1.06' Max Vel=7.20 fps Inflow=11.00 cfs 2.626 af
21.0" Round Pipe n=0.013 L=492.0' S=0.0103 '/' Capacity=16.08 cfs Outflow=11.00 cfs 2.626 af

Reach 3R: B3-12-DMH to outfall Avg. Flow Depth=0.67' Max Vel=13.04 fps Inflow=12.02 cfs 2.829 af
24.0" Round Pipe n=0.011 L=130.0' S=0.0346 '/' Capacity=49.74 cfs Outflow=12.01 cfs 2.829 af

Reach 4R: C2-02-DMH to C2-03-DMH Avg. Flow Depth=0.75' Max Vel=7.42 fps Inflow=5.73 cfs 0.952 af
15.0" Round Pipe n=0.013 L=84.0' S=0.0173 '/' Capacity=8.49 cfs Outflow=5.73 cfs 0.952 af

Reach 5R: C2-03-DMH to C2-04-DMH Avg. Flow Depth=0.62' Max Vel=9.35 fps Inflow=5.73 cfs 0.952 af
15.0" Round Pipe n=0.013 L=190.0' S=0.0316 '/' Capacity=11.48 cfs Outflow=5.72 cfs 0.952 af

Pond 1P: Wetland Replication Peak Elev=377.40' Storage=6,583 cf Inflow=7.64 cfs 0.822 af
Outflow=7.24 cfs 0.699 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=307.43' Storage=4,708 cf Inflow=19.46 cfs 3.572 af
Primary=16.97 cfs 3.572 af Secondary=0.00 cfs 0.000 af Outflow=16.97 cfs 3.572 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=312.61' Storage=1,182 cf Inflow=13.20 cfs 1.636 af
Primary=13.03 cfs 1.625 af Secondary=0.00 cfs 0.000 af Outflow=13.03 cfs 1.625 af

Pond BMP-1: BMP-1 Peak Elev=373.81' Storage=20,957 cf Inflow=19.44 cfs 1.533 af
Outflow=5.42 cfs 1.533 af

Pond BMP-2: BMP-2 Peak Elev=372.74' Storage=9,611 cf Inflow=13.01 cfs 1.093 af
Outflow=5.66 cfs 1.093 af

Pond BMP-3: BMP-3 Peak Elev=357.72' Storage=22,961 cf Inflow=15.37 cfs 1.169 af
15.0" Round Culvert n=0.013 L=18.0' S=0.0100 '/' Outflow=5.73 cfs 0.952 af

Pond BMP-4: BMP-4 Peak Elev=335.42' Storage=18,156 cf Inflow=22.22 cfs 1.902 af
24.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=15.10 cfs 1.841 af

Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road Inflow=81.61 cfs 10.705 af
Primary=81.61 cfs 10.705 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=0.55 cfs 0.045 af
Primary=0.55 cfs 0.045 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=8.06 cfs 0.763 af
Primary=8.06 cfs 0.763 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=5.99 cfs 0.491 af
Primary=5.99 cfs 0.491 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=7.76 cfs 0.648 af
Primary=7.76 cfs 0.648 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=1.85 cfs 0.168 af
Primary=1.85 cfs 0.168 af

Link POA-9: POA-9 Residences Inflow=0.31 cfs 0.026 af
Primary=0.31 cfs 0.026 af

Total Runoff Area = 46.730 ac Runoff Volume = 13.258 af Average Runoff Depth = 3.40"
62.70% Pervious = 29.299 ac 37.30% Impervious = 17.431 ac

Summary for Subcatchment PWS-1: PWS-1 Loading

Runoff = 6.40 cfs @ 12.08 hrs, Volume= 0.473 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-10: PWS-10 NE corner (Fields)

Runoff = 0.31 cfs @ 12.16 hrs, Volume= 0.026 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
6,269	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,269	70	Weighted Average
6,269		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS**
					Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-11: PWS-11 SE edge

Runoff = 0.82 cfs @ 12.12 hrs, Volume= 0.064 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
1,211	74	>75% Grass cover, Good, HSG C
13,911	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
15,122	70	Weighted Average
15,122		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0540	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-12: PWS-12 E to wetland replication

Runoff = 2.90 cfs @ 12.39 hrs, Volume= 0.348 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
35,208	74	>75% Grass cover, Good, HSG C
27,704	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,160	98	Water Surface, HSG C
69,072	75	Weighted Average
62,912		91.08% Pervious Area
6,160		8.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
14.1	501	0.0140	0.59		**Shallow Concentrated Flow, SCF 258 FT** Woodland Kv= 5.0 fps
27.0	551	Total			

Summary for Subcatchment PWS-13: PWS-13 NE corner

Runoff = 1.85 cfs @ 12.18 hrs, Volume= 0.168 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
3,912	74	>75% Grass cover, Good, HSG C
35,761	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
39,673	70	Weighted Average
39,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
2.4	134	0.0360	0.95		**Shallow Concentrated Flow, SCF 134 FT WOODS** Woodland Kv= 5.0 fps
12.9	184	Total			

Summary for Subcatchment PWS-14: PWS-14 N Bldg

Runoff = 13.04 cfs @ 12.08 hrs, Volume= 1.060 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	110,964	98	Roof, HSG C
	110,964		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-15: PWS-15 S Bldg (minus 20K to recharge)

Runoff = 4.64 cfs @ 12.08 hrs, Volume= 0.377 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	39,471	98	Roof, HSG C
	39,471		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-16: PWS-16 "D-Series" Wetland Tributary

Runoff = 5.99 cfs @ 12.14 hrs, Volume= 0.491 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
82,594	77	Woods, Good, HSG D
5,578	96	Gravel surface, HSG D
88,172	78	Weighted Average
88,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment PWS-17: PWS-17 CB at top of paved access drive

Runoff = 1.40 cfs @ 12.09 hrs, Volume= 0.102 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
7,868	98	Paved parking, HSG C
5,847	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
13,715	88	Weighted Average
5,847		42.63% Pervious Area
7,868		57.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-18: PWS-18 Tri-County Drive Tributary

Runoff = 7.76 cfs @ 12.14 hrs, Volume= 0.648 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
51,279	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
27,700	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
87,171	88	Weighted Average
32,014		36.73% Pervious Area
55,157		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment PWS-19: PWS-19 S of Central Parking

Runoff = 0.55 cfs @ 12.15 hrs, Volume= 0.045 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
6,122	74	>75% Grass cover, Good, HSG C
3,848	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
9,970	72	Weighted Average
9,970		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	128	0.0700	1.32		**Shallow Concentrated Flow, SCF 128 FT** Woodland Kv= 5.0 fps
10.1	178	Total			

Summary for Subcatchment PWS-2: PWS-2 Parking S of Bldg

Runoff = 8.43 cfs @ 12.10 hrs, Volume= 0.716 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
	43,283	98	Paved parking, HSG C
*	31,659	98	>75% Grass cover, Good, HSG C
	74,942	98	Weighted Average
	74,942		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0144	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	33	0.0360	1.33		**Shallow Concentrated Flow, SCF 33 FT** Short Grass Pasture Kv= 7.0 fps
0.5	51	0.0060	1.57		**Shallow Concentrated Flow, SCF 51 FT** Paved Kv= 20.3 fps
7.3	134	Total			

Summary for Subcatchment PWS-20: PWS-20 CB at top of driveway

Runoff = 1.37 cfs @ 12.08 hrs, Volume= 0.101 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
8,427	98	Paved parking, HSG C
4,499	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
12,926	90	Weighted Average
4,499		34.81% Pervious Area
8,427		65.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-21: PWS-21 Tri-County Drive to CB

Runoff = 0.90 cfs @ 12.08 hrs, Volume= 0.073 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
7,624	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
7,624	98	Weighted Average
7,624		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-22: PWS-22 Bldg to recharge

Runoff = 2.35 cfs @ 12.08 hrs, Volume= 0.191 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	20,000	98	Roof, HSG C
	20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-23: PWS-23 Loading Area and Shed to wetland replication

Runoff = 6.40 cfs @ 12.08 hrs, Volume= 0.473 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-3: PWS-3 Central Parking

Runoff = 13.02 cfs @ 12.08 hrs, Volume= 0.978 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	90,299	98	Paved parking & bldg, HSG C
	28,232	74	>75% Grass cover, Good, HSG C
	118,531	92	Weighted Average
	28,232		23.82% Pervious Area
	90,299		76.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-4: PWS-4 N Central Parking

Runoff = 11.23 cfs @ 12.15 hrs, Volume= 0.957 af, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	69,719	98	Paved parking & bldg, HSG C
	66,081	74	>75% Grass cover, Good, HSG C
	135,800	86	Weighted Average
	66,081		48.66% Pervious Area
	69,719		51.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	41	0.0480	1.53		**Shallow Concentrated Flow, SCF 41 FT** Short Grass Pasture Kv= 7.0 fps
0.3	65	0.0310	3.57		**Shallow Concentrated Flow, SCF 65 FT** Paved Kv= 20.3 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
11.0	156	Total			

Summary for Subcatchment PWS-5: PWS-5 Play Fields

Runoff = 38.81 cfs @ 12.20 hrs, Volume= 3.595 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

	Area (sf)	CN	Description
*	103,282	98	Paved parking & bldg, HSG C
	463,146	74	>75% Grass cover, Good, HSG C
	65,535	70	Woods, Good, HSG C
	14,261	87	Dirt roads, HSG C
	646,224	78	Weighted Average
	542,942		84.02% Pervious Area
	103,282		15.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0120	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
6.4	514	0.0370	1.35		**Shallow Concentrated Flow, SCF 514 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
14.5	1,344	Total			

Summary for Subcatchment PWS-6: PWS-6 W Main drive

Runoff = 3.46 cfs @ 12.13 hrs, Volume= 0.282 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
20,613	98	Paved parking, HSG C
18,374	74	>75% Grass cover, Good, HSG C
38,987	87	Weighted Average
18,374		47.13% Pervious Area
20,613		52.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	198	0.0680	1.83		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
1.2	256	0.0300	3.52		**Shallow Concentrated Flow, SCF 256 FT** Paved Kv= 20.3 fps
9.5	504	Total			

Summary for Subcatchment PWS-7: PWS-7 E Baseball & Wetland Tributary

Runoff = 7.57 cfs @ 12.23 hrs, Volume= 0.743 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
1,497	98	Paved parking, HSG C
83,000	74	>75% Grass cover, Good, HSG C
67,324	70	Woods, Good, HSG C
5,812	87	Dirt roads, HSG C
157,633	73	Weighted Average
156,136		99.05% Pervious Area
1,497		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
7.3	258	0.0070	0.59		**Shallow Concentrated Flow, SCF 258 FT** Short Grass Pasture Kv= 7.0 fps
2.4	254	0.1230	1.75		**Shallow Concentrated Flow, SCF 254 FT** Woodland Kv= 5.0 fps
0.3					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
16.5	562	Total			

Summary for Subcatchment PWS-8: PWS-8 W Baseball & Wetland Tributary

Runoff = 7.94 cfs @ 12.16 hrs, Volume= 0.684 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
6,188	98	Paved parking, HSG C
60,836	74	>75% Grass cover, Good, HSG C
67,878	70	Woods, Good, HSG C
5,294	87	Dirt roads, HSG C
140,196	74	Weighted Average
134,008		95.59% Pervious Area
6,188		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	198	0.0100	0.70		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
11.7	248	Total			

Summary for Subcatchment PWS-9: PWS-9 W Parking & SW football field

Runoff = 7.56 cfs @ 12.15 hrs, Volume= 0.663 af, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.23"

Area (sf)	CN	Description
59,027	98	Paved parking, HSG C
23,360	74	>75% Grass cover, Good, HSG C
82,387	91	Weighted Average
23,360		28.35% Pervious Area
59,027		71.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0110	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.9	120	0.1090	2.31		**Shallow Concentrated Flow, SCF 120 FT** Short Grass Pasture Kv= 7.0 fps
3.0	405	0.0120	2.22		**Shallow Concentrated Flow, SCF 405 FT** Paved Kv= 20.3 fps
11.0	575	Total			

Summary for Reach 1R: B4-03-DMH to B4-08-DMH

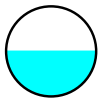
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-1 Primary device # 1 OUTLET by 0.66'

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 4.68" for 10-year event
Inflow = 5.42 cfs @ 12.42 hrs, Volume= 1.533 af
Outflow = 5.42 cfs @ 12.44 hrs, Volume= 1.533 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.99 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.44 fps, Avg. Travel Time= 2.8 min

Peak Storage= 216 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 239.0' Slope= 0.0100 '/'
Inlet Invert= 369.10', Outlet Invert= 366.71'



Stage-Area-Storage for Reach 1R: B4-03-DMH to B4-08-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
369.10	0.0	0	370.14	1.3	312
369.12	0.0	1	370.16	1.3	319
369.14	0.0	3	370.18	1.4	326
369.16	0.0	6	370.20	1.4	332
369.18	0.0	9	370.22	1.4	338
369.20	0.1	12	370.24	1.4	344
369.22	0.1	16	370.26	1.5	350
369.24	0.1	20	370.28	1.5	356
369.26	0.1	24	370.30	1.5	362
369.28	0.1	29	370.32	1.5	368
369.30	0.1	33	370.34	1.6	373
369.32	0.2	38	370.36	1.6	379
369.34	0.2	44	370.38	1.6	384
369.36	0.2	49	370.40	1.6	389
369.38	0.2	54	370.42	1.6	394
369.40	0.3	60	370.44	1.7	398
369.42	0.3	66	370.46	1.7	402
369.44	0.3	72	370.48	1.7	407
369.46	0.3	78	370.50	1.7	410
369.48	0.4	84	370.52	1.7	414
369.50	0.4	90	370.54	1.7	417
369.52	0.4	97	370.56	1.8	419
369.54	0.4	103	370.58	1.8	421
369.56	0.5	110	370.60	**1.8**	**422**
369.58	0.5	117			
369.60	0.5	123			
369.62	0.5	130			
369.64	0.6	137			
369.66	0.6	144			
369.68	0.6	151			
369.70	0.7	158			
369.72	0.7	165			
369.74	0.7	172			
369.76	0.7	179			
369.78	0.8	186			
369.80	0.8	193			
369.82	0.8	200			
369.84	0.9	208			
369.86	0.9	215			
369.88	0.9	222			
369.90	1.0	229			
369.92	1.0	236			
369.94	1.0	243			
369.96	1.0	250			
369.98	1.1	258			
370.00	1.1	265			
370.02	1.1	272			
370.04	1.2	279			
370.06	1.2	285			
370.08	1.2	292			
370.10	1.3	299			
370.12	1.3	306			

Summary for Reach 2R: B4-08-DMH to B4-11-DMH

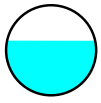
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 1R outlet invert by 0.27' @ 12.36 hrs
[79] Warning: Submerged Pond BMP-2 Primary device # 1 OUTLET by 0.73'

Inflow Area = 6.560 ac, 92.53% Impervious, Inflow Depth = 4.80" for 10-year event
Inflow = 11.00 cfs @ 12.35 hrs, Volume= 2.626 af
Outflow = 11.00 cfs @ 12.38 hrs, Volume= 2.626 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.20 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 5.0 min

Peak Storage= 752 cf @ 12.36 hrs
Average Depth at Peak Storage= 1.06'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 16.08 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 492.0' Slope= 0.0103 '/'
Inlet Invert= 365.92', Outlet Invert= 360.85'



Stage-Area-Storage for Reach 2R: B4-08-DMH to B4-11-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
365.92	0.0	0	366.96	1.5	733
365.94	0.0	3	366.98	1.5	750
365.96	0.0	7	367.00	1.6	767
365.98	0.0	13	367.02	1.6	783
366.00	0.0	19	367.04	1.6	800
366.02	0.1	27	367.06	1.7	816
366.04	0.1	35	367.08	1.7	833
366.06	0.1	44	367.10	1.7	849
366.08	0.1	54	367.12	1.8	865
366.10	0.1	64	367.14	1.8	881
366.12	0.2	75	367.16	1.8	897
366.14	0.2	86	367.18	1.9	912
366.16	0.2	98	367.20	1.9	928
366.18	0.2	110	367.22	1.9	943
366.20	0.2	122	367.24	1.9	958
366.22	0.3	135	367.26	2.0	972
366.24	0.3	148	367.28	2.0	987
366.26	0.3	162	367.30	2.0	1,001
366.28	0.4	175	367.32	2.1	1,015
366.30	0.4	189	367.34	2.1	1,029
366.32	0.4	204	367.36	2.1	1,042
366.34	0.4	218	367.38	2.1	1,055
366.36	0.5	233	367.40	2.2	1,067
366.38	0.5	248	367.42	2.2	1,080
366.40	0.5	264	367.44	2.2	1,092
366.42	0.6	279	367.46	2.2	1,103
366.44	0.6	295	367.48	2.3	1,114
366.46	0.6	310	367.50	2.3	1,124
366.48	0.7	326	367.52	2.3	1,134
366.50	0.7	343	367.54	2.3	1,144
366.52	0.7	359	367.56	2.3	1,152
366.54	0.8	375	367.58	2.4	1,160
366.56	0.8	392	367.60	2.4	1,168
366.58	0.8	408	367.62	2.4	1,174
366.60	0.9	425	367.64	2.4	1,179
366.62	0.9	442	367.66	**2.4**	**1,182**
366.64	0.9	459			
366.66	1.0	476			
366.68	1.0	493			
366.70	1.0	510			
366.72	1.1	527			
366.74	1.1	544			
366.76	1.1	562			
366.78	1.2	579			
366.80	1.2	596			
366.82	1.2	613			
366.84	1.3	630			
366.86	1.3	648			
366.88	1.4	665			
366.90	1.4	682			
366.92	1.4	699			
366.94	1.5	716			

Summary for Reach 3R: B3-12-DMH to outfall

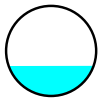
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 7.171 ac, 89.86% Impervious, Inflow Depth = 4.73" for 10-year event
Inflow = 12.02 cfs @ 12.30 hrs, Volume= 2.829 af
Outflow = 12.01 cfs @ 12.30 hrs, Volume= 2.829 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 13.04 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.99 fps, Avg. Travel Time= 0.7 min

Peak Storage= 120 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 49.74 cfs

24.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 130.0' Slope= 0.0346 '/'
Inlet Invert= 352.30', Outlet Invert= 347.80'



Stage-Area-Storage for Reach 3R: B3-12-DMH to outfall

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
352.30	0.0	0	353.34	1.7	215
352.32	0.0	1	353.36	1.7	220
352.34	0.0	2	353.38	1.7	225
352.36	0.0	4	353.40	1.8	230
352.38	0.0	5	353.42	1.8	235
352.40	0.1	8	353.44	1.8	240
352.42	0.1	10	353.46	1.9	246
352.44	0.1	13	353.48	1.9	251
352.46	0.1	15	353.50	2.0	256
352.48	0.1	18	353.52	2.0	261
352.50	0.2	21	353.54	2.0	266
352.52	0.2	24	353.56	2.1	271
352.54	0.2	28	353.58	2.1	276
352.56	0.2	31	353.60	2.2	281
352.58	0.3	35	353.62	2.2	286
352.60	0.3	38	353.64	2.2	291
352.62	0.3	42	353.66	2.3	296
352.64	0.4	46	353.68	2.3	301
352.66	0.4	50	353.70	2.3	305
352.68	0.4	54	353.72	2.4	310
352.70	0.4	58	353.74	2.4	315
352.72	0.5	62	353.76	2.5	319
352.74	0.5	67	353.78	2.5	324
352.76	0.5	71	353.80	2.5	329
352.78	0.6	75	353.82	2.6	333
352.80	0.6	80	353.84	2.6	337
352.82	0.6	84	353.86	2.6	342
352.84	0.7	89	353.88	2.7	346
352.86	0.7	94	353.90	2.7	350
352.88	0.8	98	353.92	2.7	354
352.90	0.8	103	353.94	2.8	358
352.92	0.8	108	353.96	2.8	362
352.94	0.9	113	353.98	2.8	366
352.96	0.9	118	354.00	2.8	370
352.98	0.9	122	354.02	2.9	374
353.00	1.0	127	354.04	2.9	377
353.02	1.0	132	354.06	2.9	381
353.04	1.1	137	354.08	3.0	384
353.06	1.1	142	354.10	3.0	387
353.08	1.1	147	354.12	3.0	390
353.10	1.2	153	354.14	3.0	393
353.12	1.2	158	354.16	3.0	396
353.14	1.3	163	354.18	3.1	398
353.16	1.3	168	354.20	3.1	401
353.18	1.3	173	354.22	3.1	403
353.20	1.4	178	354.24	3.1	405
353.22	1.4	183	354.26	3.1	406
353.24	1.5	189	354.28	3.1	408
353.26	1.5	194	354.30	**3.1**	**408**
353.28	1.5	199			
353.30	1.6	204			
353.32	1.6	209			

Summary for Reach 4R: C2-02-DMH to C2-03-DMH

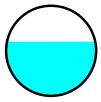
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-3 Primary device # 1 INLET by 0.45'

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 3.59" for 10-year event
Inflow = 5.73 cfs @ 12.33 hrs, Volume= 0.952 af
Outflow = 5.73 cfs @ 12.33 hrs, Volume= 0.952 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.42 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 0.9 min

Peak Storage= 65 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.75'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.49 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 84.0' Slope= 0.0173 '/'
Inlet Invert= 355.70', Outlet Invert= 354.25'



Stage-Area-Storage for Reach 4R: C2-02-DMH to C2-03-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
355.70	0.0	0	356.74	1.1	92
355.72	0.0	0	356.76	1.1	93
355.74	0.0	1	356.78	1.1	95
355.76	0.0	2	356.80	1.1	96
355.78	0.0	3	356.82	1.2	97
355.80	0.0	4	356.84	1.2	99
355.82	0.1	5	356.86	1.2	100
355.84	0.1	6	356.88	1.2	101
355.86	0.1	8	356.90	1.2	102
355.88	0.1	9	356.92	1.2	102
355.90	0.1	11	356.94	**1.2**	**103**
355.92	0.1	12			
355.94	0.2	14			
355.96	0.2	16			
355.98	0.2	17			
356.00	0.2	19			
356.02	0.2	21			
356.04	0.3	23			
356.06	0.3	25			
356.08	0.3	26			
356.10	0.3	28			
356.12	0.4	30			
356.14	0.4	32			
356.16	0.4	34			
356.18	0.4	36			
356.20	0.5	39			
356.22	0.5	41			
356.24	0.5	43			
356.26	0.5	45			
356.28	0.6	47			
356.30	0.6	49			
356.32	0.6	51			
356.34	0.6	53			
356.36	0.7	55			
356.38	0.7	57			
356.40	0.7	59			
356.42	0.7	61			
356.44	0.8	64			
356.46	0.8	66			
356.48	0.8	68			
356.50	0.8	70			
356.52	0.9	72			
356.54	0.9	74			
356.56	0.9	76			
356.58	0.9	78			
356.60	0.9	79			
356.62	1.0	81			
356.64	1.0	83			
356.66	1.0	85			
356.68	1.0	87			
356.70	1.1	88			
356.72	1.1	90			

Summary for Reach 5R: C2-03-DMH to C2-04-DMH

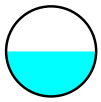
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 4R outlet invert by 0.37' @ 12.34 hrs

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 3.59" for 10-year event
Inflow = 5.73 cfs @ 12.33 hrs, Volume= 0.952 af
Outflow = 5.72 cfs @ 12.34 hrs, Volume= 0.952 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.35 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.93 fps, Avg. Travel Time= 1.6 min

Peak Storage= 116 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 11.48 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 190.0' Slope= 0.0316 '/'
Inlet Invert= 354.00', Outlet Invert= 348.00'



Stage-Area-Storage for Reach 5R: C2-03-DMH to C2-04-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
354.00	0.0	0	355.04	1.1	207
354.02	0.0	1	355.06	1.1	211
354.04	0.0	2	355.08	1.1	214
354.06	0.0	4	355.10	1.1	217
354.08	0.0	6	355.12	1.2	220
354.10	0.0	9	355.14	1.2	223
354.12	0.1	11	355.16	1.2	226
354.14	0.1	14	355.18	1.2	228
354.16	0.1	17	355.20	1.2	230
354.18	0.1	21	355.22	1.2	232
354.20	0.1	24	355.24	**1.2**	**233**
354.22	0.1	28			
354.24	0.2	31			
354.26	0.2	35			
354.28	0.2	39			
354.30	0.2	43			
354.32	0.2	47			
354.34	0.3	51			
354.36	0.3	56			
354.38	0.3	60			
354.40	0.3	64			
354.42	0.4	69			
354.44	0.4	73			
354.46	0.4	78			
354.48	0.4	82			
354.50	0.5	87			
354.52	0.5	92			
354.54	0.5	96			
354.56	0.5	101			
354.58	0.6	106			
354.60	0.6	111			
354.62	0.6	115			
354.64	0.6	120			
354.66	0.7	125			
354.68	0.7	130			
354.70	0.7	134			
354.72	0.7	139			
354.74	0.8	144			
354.76	0.8	148			
354.78	0.8	153			
354.80	0.8	158			
354.82	0.9	162			
354.84	0.9	167			
354.86	0.9	171			
354.88	0.9	175			
354.90	0.9	180			
354.92	1.0	184			
354.94	1.0	188			
354.96	1.0	192			
354.98	1.0	196			
355.00	1.1	200			
355.02	1.1	204			

Summary for Pond 1P: Wetland Replication

Inflow Area = 2.971 ac, 34.91% Impervious, Inflow Depth = 3.32" for 10-year event
Inflow = 7.64 cfs @ 12.09 hrs, Volume= 0.822 af
Outflow = 7.24 cfs @ 12.12 hrs, Volume= 0.699 af, Atten= 5%, Lag= 1.9 min
Primary = 7.24 cfs @ 12.12 hrs, Volume= 0.699 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.40' @ 12.12 hrs Surf.Area= 8,592 sf Storage= 6,583 cf

Plug-Flow detention time= 104.0 min calculated for 0.699 af (85% of inflow)
Center-of-Mass det. time= 39.2 min (855.1 - 815.9)

Volume	Invert	Avail.Storage	Storage Description
#1	376.50'	7,475 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.50	6,160	400.0	0	0	6,160
377.00	7,440	495.0	3,395	3,395	12,930
377.50	8,900	515.0	4,080	7,475	14,557

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=7.23 cfs @ 12.12 hrs HW=377.40' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 7.23 cfs @ 0.98 fps)

Stage-Area-Storage for Pond 1P: Wetland Replication

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.50	6,160	0	377.02	7,496	3,544
376.51	6,184	62	377.03	7,524	3,619
376.52	6,209	124	377.04	7,552	3,695
376.53	6,233	186	377.05	7,580	3,770
376.54	6,258	248	377.06	7,608	3,846
376.55	6,283	311	377.07	7,637	3,923
376.56	6,307	374	377.08	7,665	3,999
376.57	6,332	437	377.09	7,693	4,076
376.58	6,357	501	377.10	7,722	4,153
376.59	6,381	564	377.11	7,750	4,230
376.60	6,406	628	377.12	7,778	4,308
376.61	6,431	692	377.13	7,807	4,386
376.62	6,456	757	377.14	7,836	4,464
376.63	6,481	822	377.15	7,864	4,543
376.64	6,506	887	377.16	7,893	4,621
376.65	6,531	952	377.17	7,922	4,701
376.66	6,556	1,017	377.18	7,951	4,780
376.67	6,582	1,083	377.19	7,979	4,860
376.68	6,607	1,149	377.20	8,008	4,939
376.69	6,632	1,215	377.21	8,037	5,020
376.70	6,658	1,281	377.22	8,066	5,100
376.71	6,683	1,348	377.23	8,095	5,181
376.72	6,708	1,415	377.24	8,124	5,262
376.73	6,734	1,482	377.25	8,154	5,343
376.74	6,759	1,550	377.26	8,183	5,425
376.75	6,785	1,617	377.27	8,212	5,507
376.76	6,811	1,685	377.28	8,241	5,589
376.77	6,836	1,754	377.29	8,271	5,672
376.78	6,862	1,822	377.30	8,300	5,755
376.79	6,888	1,891	377.31	8,330	5,838
376.80	6,914	1,960	377.32	8,359	5,921
376.81	6,939	2,029	377.33	8,389	6,005
376.82	6,965	2,099	377.34	8,419	6,089
376.83	6,991	2,169	377.35	8,448	6,174
376.84	7,017	2,239	377.36	8,478	6,258
376.85	7,043	2,309	377.37	8,508	6,343
376.86	7,069	2,379	377.38	8,538	6,428
376.87	7,096	2,450	377.39	8,568	6,514
376.88	7,122	2,521	377.40	8,598	6,600
376.89	7,148	2,593	377.41	8,628	6,686
376.90	7,174	2,664	377.42	8,658	6,772
376.91	7,201	2,736	377.43	8,688	6,859
376.92	7,227	2,808	377.44	8,718	6,946
376.93	7,254	2,881	377.45	8,748	7,033
376.94	7,280	2,953	377.46	8,778	7,121
376.95	7,307	3,026	377.47	8,809	7,209
376.96	7,333	3,100	377.48	8,839	7,297
376.97	7,360	3,173	377.49	8,870	7,386
376.98	7,386	3,247	377.50	**8,900**	**7,475**
376.99	7,413	3,321			
377.00	7,440	3,395			
377.01	7,468	3,470			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 10.790 ac, 60.04% Impervious, Inflow Depth = 3.97" for 10-year event
Inflow = 19.46 cfs @ 12.24 hrs, Volume= 3.572 af
Outflow = 16.97 cfs @ 12.43 hrs, Volume= 3.572 af, Atten= 13%, Lag= 11.5 min
Primary = 16.97 cfs @ 12.43 hrs, Volume= 3.572 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 307.43' @ 12.43 hrs Surf.Area= 2,267 sf Storage= 4,708 cf

Plug-Flow detention time= 1.5 min calculated for 3.572 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (827.6 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=16.97 cfs @ 12.43 hrs HW=307.43' (Free Discharge)
↑**1=Culvert** (Inlet Controls 16.97 cfs @ 9.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.70' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 6.399 ac, 41.79% Impervious, Inflow Depth = 3.07" for 10-year event
Inflow = 13.20 cfs @ 12.18 hrs, Volume= 1.636 af
Outflow = 13.03 cfs @ 12.20 hrs, Volume= 1.625 af, Atten= 1%, Lag= 1.4 min
Primary = 13.03 cfs @ 12.20 hrs, Volume= 1.625 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 312.61' @ 12.20 hrs Surf.Area= 1,210 sf Storage= 1,182 cf

Plug-Flow detention time= 13.8 min calculated for 1.625 af (99% of inflow)
Center-of-Mass det. time= 3.3 min (881.8 - 878.5)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.02 cfs @ 12.20 hrs HW=312.61' (Free Discharge)
↑**1=Culvert** (Inlet Controls 13.02 cfs @ 4.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Pond BMP-1: BMP-1

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 4.68" for 10-year event
Inflow = 19.44 cfs @ 12.08 hrs, Volume= 1.533 af
Outflow = 5.42 cfs @ 12.42 hrs, Volume= 1.533 af, Atten= 72%, Lag= 20.4 min
Primary = 5.42 cfs @ 12.42 hrs, Volume= 1.533 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 373.81' @ 12.42 hrs Surf.Area= 9,552 sf Storage= 20,957 cf

Plug-Flow detention time= 80.7 min calculated for 1.533 af (100% of inflow)
Center-of-Mass det. time= 81.0 min (841.2 - 760.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	371.25'	0 cf	**48.27'W x 197.88'L x 4.67'H Field A** 44,574 cf Overall - 44,574 cf Embedded = 0 cf x 40.0% Voids
#2A	371.25'	32,781 cf	**StormTrap ST1 SingleTrap 4-0** x 98 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 98 Chambers in 7 Rows 48.27' x 196.88' Core + 0.00' x 0.50' Border = 48.27' x 197.88' System
		32,781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	371.25'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 371.25' / 369.20' S= 0.0131 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	371.25'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	374.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.42 cfs @ 12.42 hrs HW=373.81' (Free Discharge)
↑**1=Culvert** (Passes 5.42 cfs of 11.44 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 5.42 cfs @ 6.91 fps)
↑**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BMP-1: BMP-1 - Chamber Wizard Field A

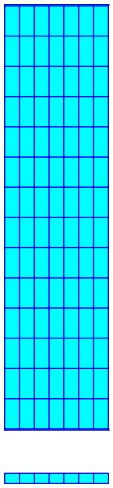
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

14 Chambers/Row x 14.06' Long = 196.88' Row Length +6.0" Border x 2 = 197.88' Base Length
7 Rows x 82.7" Wide = 48.27' Base Width
56.0" Chamber Height = 4.67' Field Height

98 Chambers x 334.5 cf = 32,781.1 cf Chamber Storage
98 Chambers x 452.5 cf + 225.3 cf Border = 44,574.1 cf Displacement

Chamber Storage = 32,781.1 cf = 0.753 af
Overall Storage Efficiency = 73.5%
Overall System Size = 197.88' x 48.27' x 4.67'

98 Chambers (plus border)
1,650.9 cy Field



Stage-Area-Storage for Pond BMP-1: BMP-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
371.25	0	373.85	21,308
371.30	410	373.90	21,718
371.35	820	373.95	22,127
371.40	1,229	374.00	22,537
371.45	1,639	374.05	22,947
371.50	2,049	374.10	23,357
371.55	2,459	374.15	23,766
371.60	2,868	374.20	24,176
371.65	3,278	374.25	24,586
371.70	3,688	374.30	24,996
371.75	4,098	374.35	25,405
371.80	4,507	374.40	25,815
371.85	4,917	374.45	26,225
371.90	5,327	374.50	26,635
371.95	5,737	374.55	27,044
372.00	6,146	374.60	27,454
372.05	6,556	374.65	27,864
372.10	6,966	374.70	28,274
372.15	7,376	374.75	28,683
372.20	7,786	374.80	29,093
372.25	8,195	374.85	29,503
372.30	8,605	374.90	29,913
372.35	9,015	374.95	30,323
372.40	9,425	375.00	30,732
372.45	9,834	375.05	31,142
372.50	10,244	375.10	31,552
372.55	10,654	375.15	31,962
372.60	11,064	375.20	32,371
372.65	11,473	375.25	32,781
372.70	11,883	375.30	32,781
372.75	12,293	375.35	32,781
372.80	12,703	375.40	32,781
372.85	13,112	375.45	32,781
372.90	13,522	375.50	32,781
372.95	13,932	375.55	32,781
373.00	14,342	375.60	32,781
373.05	14,752	375.65	32,781
373.10	15,161	375.70	32,781
373.15	15,571	375.75	32,781
373.20	15,981	375.80	32,781
373.25	16,391	375.85	32,781
373.30	16,800	375.90	**32,781**
373.35	17,210		
373.40	17,620		
373.45	18,030		
373.50	18,439		
373.55	18,849		
373.60	19,259		
373.65	19,669		
373.70	20,078		
373.75	20,488		
373.80	20,898		

Summary for Pond BMP-2: BMP-2

Inflow Area = 2.627 ac,100.00% Impervious, Inflow Depth = 4.99" for 10-year event
Inflow = 13.01 cfs @ 12.09 hrs, Volume= 1.093 af
Outflow = 5.66 cfs @ 12.29 hrs, Volume= 1.093 af, Atten= 57%, Lag= 12.0 min
Primary = 5.66 cfs @ 12.29 hrs, Volume= 1.093 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 372.74' @ 12.29 hrs Surf.Area= 4,114 sf Storage= 9,611 cf

Plug-Flow detention time= 37.7 min calculated for 1.093 af (100% of inflow)
Center-of-Mass det. time= 37.9 min (785.9 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	0 cf	**41.38'W x 99.44'L x 4.67'H Field A** 19,200 cf Overall - 19,200 cf Embedded = 0 cf x 40.0% Voids
#2A	370.00'	14,049 cf	**StormTrap ST1 SingleTrap 4-0** x 42 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 42 Chambers in 6 Rows 41.38' x 98.44' Core + 0.00' x 0.50' Border = 41.38' x 99.44' System
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	370.00'	**21.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.00' / 366.25' S= 0.0528 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	370.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	373.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.66 cfs @ 12.29 hrs HW=372.74' (Free Discharge)
↑**1=Culvert** (Passes 5.66 cfs of 15.80 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 5.66 cfs @ 7.20 fps)
↑**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BMP-2: BMP-2 - Chamber Wizard Field A

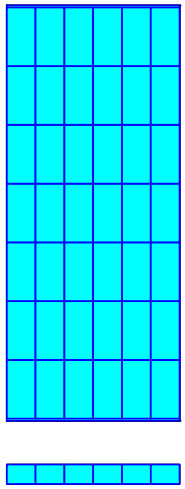
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

7 Chambers/Row x 14.06' Long = 98.44' Row Length +6.0" Border x 2 = 99.44' Base Length
6 Rows x 82.7" Wide = 41.38' Base Width
56.0" Chamber Height = 4.67' Field Height

42 Chambers x 334.5 cf = 14,049.1 cf Chamber Storage
42 Chambers x 452.5 cf + 193.1 cf Border = 19,199.7 cf Displacement

Chamber Storage = 14,049.1 cf = 0.323 af
Overall Storage Efficiency = 73.2%
Overall System Size = 99.44' x 41.38' x 4.67'

42 Chambers (plus border)
711.1 cy Field



Stage-Area-Storage for Pond BMP-2: BMP-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
370.00	0	372.60	9,132
370.05	176	372.65	9,308
370.10	351	372.70	9,483
370.15	527	372.75	9,659
370.20	702	372.80	9,834
370.25	878	372.85	10,010
370.30	1,054	372.90	10,186
370.35	1,229	372.95	10,361
370.40	1,405	373.00	10,537
370.45	1,581	373.05	10,712
370.50	1,756	373.10	10,888
370.55	1,932	373.15	11,064
370.60	2,107	373.20	11,239
370.65	2,283	373.25	11,415
370.70	2,459	373.30	11,590
370.75	2,634	373.35	11,766
370.80	2,810	373.40	11,942
370.85	2,985	373.45	12,117
370.90	3,161	373.50	12,293
370.95	3,337	373.55	12,469
371.00	3,512	373.60	12,644
371.05	3,688	373.65	12,820
371.10	3,863	373.70	12,995
371.15	4,039	373.75	13,171
371.20	4,215	373.80	13,347
371.25	4,390	373.85	13,522
371.30	4,566	373.90	13,698
371.35	4,742	373.95	13,873
371.40	4,917	374.00	14,049
371.45	5,093	374.05	14,049
371.50	5,268	374.10	14,049
371.55	5,444	374.15	14,049
371.60	5,620	374.20	14,049
371.65	5,795	374.25	14,049
371.70	5,971	374.30	14,049
371.75	6,146	374.35	14,049
371.80	6,322	374.40	14,049
371.85	6,498	374.45	14,049
371.90	6,673	374.50	14,049
371.95	6,849	374.55	14,049
372.00	7,025	374.60	14,049
372.05	7,200	374.65	**14,049**
372.10	7,376		
372.15	7,551		
372.20	7,727		
372.25	7,903		
372.30	8,078		
372.35	8,254		
372.40	8,429		
372.45	8,605		
372.50	8,781		
372.55	8,956		

Summary for Pond BMP-3: BMP-3

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 4.41" for 10-year event
Inflow = 15.37 cfs @ 12.08 hrs, Volume= 1.169 af
Outflow = 5.73 cfs @ 12.33 hrs, Volume= 0.952 af, Atten= 63%, Lag= 14.6 min
Primary = 5.73 cfs @ 12.33 hrs, Volume= 0.952 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 357.72' @ 12.33 hrs Surf.Area= 9,995 sf Storage= 22,961 cf

Plug-Flow detention time= 201.3 min calculated for 0.952 af (81% of inflow)
Center-of-Mass det. time= 128.7 min (904.4 - 775.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	354.50'	13,801 cf	**58.58'W x 170.61'L x 5.50'H Field A** 54,972 cf Overall - 20,470 cf Embedded = 34,502 cf x 40.0% Voids
#2A	355.25'	20,470 cf	**ADS_StormTech MC-3500 d +Cap** x 184 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 184 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		34,271 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	356.00'	**15.0" Round Culvert** L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 356.00' / 355.82' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.73 cfs @ 12.33 hrs HW=357.72' (Free Discharge)
↑**1=Culvert** (Barrel Controls 5.73 cfs @ 4.67 fps)

Pond BMP-3: BMP-3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

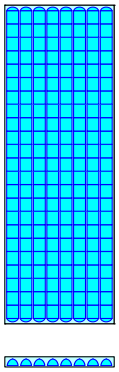
23 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 168.61' Row Length +12.0" End Stone x 2 = 170.61' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

184 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 20,469.6 cf Chamber Storage

54,972.0 cf Field - 20,469.6 cf Chambers = 34,502.4 cf Stone x 40.0% Voids = 13,801.0 cf Stone Storage

Chamber Storage + Stone Storage = 34,270.5 cf = 0.787 af
Overall Storage Efficiency = 62.3%
Overall System Size = 170.61' x 58.58' x 5.50'

184 Chambers
2,036.0 cy Field
1,277.9 cy Stone



Stage-Area-Storage for Pond BMP-3: BMP-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
354.50	0	356.58	14,233	358.66	28,798
354.54	160	356.62	14,557	358.70	28,985
354.58	320	356.66	14,881	358.74	29,168
354.62	480	356.70	15,203	358.78	29,346
354.66	640	356.74	15,524	358.82	29,521
354.70	800	356.78	15,844	358.86	29,693
354.74	960	356.82	16,163	358.90	29,863
354.78	1,119	356.86	16,480	358.94	30,029
354.82	1,279	356.90	16,797	358.98	30,192
354.86	1,439	356.94	17,112	359.02	30,353
354.90	1,599	356.98	17,426	359.06	30,512
354.94	1,759	357.02	17,739	359.10	30,672
354.98	1,919	357.06	18,050	359.14	30,832
355.02	2,079	357.10	18,361	359.18	30,992
355.06	2,239	357.14	18,669	359.22	31,152
355.10	2,399	357.18	18,977	359.26	31,312
355.14	2,559	357.22	19,283	359.30	31,472
355.18	2,719	357.26	19,587	359.34	31,632
355.22	2,879	357.30	19,890	359.38	31,792
355.26	3,085	357.34	20,191	359.42	31,952
355.30	3,433	357.38	20,491	359.46	32,112
355.34	3,780	357.42	20,789	359.50	32,272
355.38	4,127	357.46	21,085	359.54	32,431
355.42	4,473	357.50	21,380	359.58	32,591
355.46	4,819	357.54	21,673	359.62	32,751
355.50	5,164	357.58	21,964	359.66	32,911
355.54	5,508	357.62	22,253	359.70	33,071
355.58	5,852	357.66	22,540	359.74	33,231
355.62	6,196	357.70	22,825	359.78	33,391
355.66	6,538	357.74	23,108	359.82	33,551
355.70	6,881	357.78	23,389	359.86	33,711
355.74	7,222	357.82	23,667	359.90	33,871
355.78	7,563	357.86	23,944	359.94	34,031
355.82	7,904	357.90	24,218	359.98	**34,191**
355.86	8,244	357.94	24,490		
355.90	8,583	357.98	24,759		
355.94	8,921	358.02	25,025		
355.98	9,259	358.06	25,289		
356.02	9,596	358.10	25,550		
356.06	9,933	358.14	25,808		
356.10	10,269	358.18	26,064		
356.14	10,603	358.22	26,316		
356.18	10,938	358.26	26,564		
356.22	11,271	358.30	26,809		
356.26	11,604	358.34	27,051		
356.30	11,935	358.38	27,288		
356.34	12,266	358.42	27,522		
356.38	12,596	358.46	27,750		
356.42	12,925	358.50	27,973		
356.46	13,254	358.54	28,191		
356.50	13,581	358.58	28,401		
356.54	13,908	358.62	28,603		

Summary for Pond BMP-4: BMP-4

Inflow Area = 5.904 ac, 58.08% Impervious, Inflow Depth = 3.87" for 10-year event
Inflow = 22.22 cfs @ 12.14 hrs, Volume= 1.902 af
Outflow = 15.10 cfs @ 12.27 hrs, Volume= 1.841 af, Atten= 32%, Lag= 7.8 min
Primary = 15.10 cfs @ 12.27 hrs, Volume= 1.841 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 335.42' @ 12.27 hrs Surf.Area= 8,735 sf Storage= 18,156 cf

Plug-Flow detention time= 71.8 min calculated for 1.840 af (97% of inflow)
Center-of-Mass det. time= 53.3 min (854.0 - 800.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	332.50'	12,084 cf	**58.58'W x 149.10'L x 5.50'H Field A** 48,041 cf Overall - 17,831 cf Embedded = 30,211 cf x 40.0% Voids
#2A	333.25'	17,831 cf	**ADS_StormTech MC-3500 d +Cap** x 160 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 160 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		29,915 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	333.25'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 333.25' / 332.95' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=15.10 cfs @ 12.27 hrs HW=335.42' (Free Discharge)
1=Culvert (Barrel Controls 15.10 cfs @ 5.51 fps)

Pond BMP-4: BMP-4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

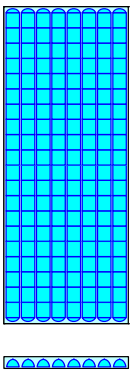
20 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 147.10' Row Length +12.0" End Stone x 2 = 149.10' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

160 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 17,830.7 cf Chamber Storage

48,041.3 cf Field - 17,830.7 cf Chambers = 30,210.6 cf Stone x 40.0% Voids = 12,084.2 cf Stone Storage

Chamber Storage + Stone Storage = 29,914.9 cf = 0.687 af
Overall Storage Efficiency = 62.3%
Overall System Size = 149.10' x 58.58' x 5.50'

160 Chambers
1,779.3 cy Field
1,118.9 cy Stone



Stage-Area-Storage for Pond BMP-4: BMP-4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
332.50	0	334.58	12,422	336.66	25,132
332.54	140	334.62	12,705	336.70	25,296
332.58	280	334.66	12,987	336.74	25,456
332.62	419	334.70	13,268	336.78	25,611
332.66	559	334.74	13,548	336.82	25,764
332.70	699	334.78	13,827	336.86	25,915
332.74	839	334.82	14,105	336.90	26,063
332.78	978	334.86	14,383	336.94	26,208
332.82	1,118	334.90	14,659	336.98	26,351
332.86	1,258	334.94	14,934	337.02	26,491
332.90	1,398	334.98	15,208	337.06	26,631
332.94	1,537	335.02	15,481	337.10	26,770
332.98	1,677	335.06	15,752	337.14	26,910
333.02	1,817	335.10	16,023	337.18	27,050
333.06	1,957	335.14	16,293	337.22	27,190
333.10	2,096	335.18	16,561	337.26	27,329
333.14	2,236	335.22	16,828	337.30	27,469
333.18	2,376	335.26	17,093	337.34	27,609
333.22	2,516	335.30	17,358	337.38	27,749
333.26	2,696	335.34	17,621	337.42	27,888
333.30	3,000	335.38	17,882	337.46	28,028
333.34	3,303	335.42	18,142	337.50	28,168
333.38	3,605	335.46	18,401	337.54	28,308
333.42	3,907	335.50	18,658	337.58	28,447
333.46	4,208	335.54	18,913	337.62	28,587
333.50	4,509	335.58	19,167	337.66	28,727
333.54	4,810	335.62	19,419	337.70	28,867
333.58	5,110	335.66	19,670	337.74	29,007
333.62	5,410	335.70	19,919	337.78	29,146
333.66	5,709	335.74	20,166	337.82	29,286
333.70	6,007	335.78	20,411	337.86	29,426
333.74	6,305	335.82	20,654	337.90	29,566
333.78	6,603	335.86	20,895	337.94	29,705
333.82	6,900	335.90	21,134	337.98	**29,845**
333.86	7,196	335.94	21,372		
333.90	7,492	335.98	21,607		
333.94	7,788	336.02	21,839		
333.98	8,082	336.06	22,069		
334.02	8,377	336.10	22,297		
334.06	8,670	336.14	22,523		
334.10	8,963	336.18	22,745		
334.14	9,255	336.22	22,965		
334.18	9,547	336.26	23,182		
334.22	9,838	336.30	23,396		
334.26	10,128	336.34	23,607		
334.30	10,417	336.38	23,815		
334.34	10,706	336.42	24,018		
334.38	10,994	336.46	24,218		
334.42	11,281	336.50	24,413		
334.46	11,567	336.54	24,602		
334.50	11,853	336.58	24,786		
334.54	12,138	336.62	24,963		

Summary for Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road

Inflow Area = 38.103 ac, 39.70% Impervious, Inflow Depth = 3.37" for 10-year event
Inflow = 81.61 cfs @ 12.22 hrs, Volume= 10.705 af
Primary = 81.61 cfs @ 12.22 hrs, Volume= 10.705 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth = 2.38" for 10-year event
Inflow = 0.55 cfs @ 12.15 hrs, Volume= 0.045 af
Primary = 0.55 cfs @ 12.15 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 3.319 ac, 31.26% Impervious, Inflow Depth = 2.76" for 10-year event
Inflow = 8.06 cfs @ 12.12 hrs, Volume= 0.763 af
Primary = 8.06 cfs @ 12.12 hrs, Volume= 0.763 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.024 ac, 0.00% Impervious, Inflow Depth = 2.91" for 10-year event
Inflow = 5.99 cfs @ 12.14 hrs, Volume= 0.491 af
Primary = 5.99 cfs @ 12.14 hrs, Volume= 0.491 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 2.001 ac, 63.27% Impervious, Inflow Depth = 3.89" for 10-year event
Inflow = 7.76 cfs @ 12.14 hrs, Volume= 0.648 af
Primary = 7.76 cfs @ 12.14 hrs, Volume= 0.648 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 0.911 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 1.85 cfs @ 12.18 hrs, Volume= 0.168 af
Primary = 1.85 cfs @ 12.18 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.144 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 0.31 cfs @ 12.16 hrs, Volume= 0.026 af
Primary = 0.31 cfs @ 12.16 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPWS-1: PWS-1 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=90 Runoff=8.07 cfs 0.605 af

SubcatchmentPWS-10: PWS-10 NE corner Runoff Area=6,269 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.45 cfs 0.037 af

SubcatchmentPWS-11: PWS-11 SE edge Runoff Area=15,122 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=50' Slope=0.0540 '/' Tc=8.3 min CN=70 Runoff=1.17 cfs 0.090 af

SubcatchmentPWS-12: PWS-12 E to Runoff Area=69,072 sf 8.92% Impervious Runoff Depth=3.63"
Flow Length=551' Tc=27.0 min CN=75 Runoff=4.00 cfs 0.479 af

SubcatchmentPWS-13: PWS-13 NE corner Runoff Area=39,673 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=184' Tc=12.9 min CN=70 Runoff=2.66 cfs 0.237 af

SubcatchmentPWS-14: PWS-14 N Bldg Runoff Area=110,964 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=15.99 cfs 1.308 af

SubcatchmentPWS-15: PWS-15 S Bldg Runoff Area=39,471 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=5.69 cfs 0.465 af

SubcatchmentPWS-16: PWS-16 "D-Series" Runoff Area=88,172 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=376' Tc=10.2 min CN=78 Runoff=8.10 cfs 0.664 af

SubcatchmentPWS-17: PWS-17 CB at top Runoff Area=13,715 sf 57.37% Impervious Runoff Depth=5.01"
Tc=6.0 min CN=88 Runoff=1.78 cfs 0.132 af

SubcatchmentPWS-18: PWS-18 Runoff Area=87,171 sf 63.27% Impervious Runoff Depth=5.01"
Flow Length=283' Tc=10.1 min CN=88 Runoff=9.88 cfs 0.836 af

SubcatchmentPWS-19: PWS-19 S of Central Runoff Area=9,970 sf 0.00% Impervious Runoff Depth=3.32"
Flow Length=178' Tc=10.1 min CN=72 Runoff=0.78 cfs 0.063 af

SubcatchmentPWS-2: PWS-2 Parking S Runoff Area=74,942 sf 100.00% Impervious Runoff Depth=6.16"
Flow Length=134' Tc=7.3 min CN=98 Runoff=10.33 cfs 0.883 af

SubcatchmentPWS-20: PWS-20 CB at top Runoff Area=12,926 sf 65.19% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=90 Runoff=1.73 cfs 0.129 af

SubcatchmentPWS-21: PWS-21 Runoff Area=7,624 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=1.10 cfs 0.090 af

SubcatchmentPWS-22: PWS-22 Bldg to Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=2.88 cfs 0.236 af

SubcatchmentPWS-23: PWS-23 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=90 Runoff=8.07 cfs 0.605 af

SubcatchmentPWS-3: PWS-3 Central Runoff Area=118,531 sf 76.18% Impervious Runoff Depth=5.46"
Tc=6.0 min CN=92 Runoff=16.27 cfs 1.239 af

SubcatchmentPWS-4: PWS-4 N Central Runoff Area=135,800 sf 51.34% Impervious Runoff Depth=4.79"
Flow Length=156' Tc=11.0 min CN=86 Runoff=14.46 cfs 1.245 af

SubcatchmentPWS-5: PWS-5 Play Fields Runoff Area=646,224 sf 15.98% Impervious Runoff Depth=3.93"
Flow Length=1,344' Tc=14.5 min CN=78 Runoff=52.45 cfs 4.864 af

SubcatchmentPWS-6: PWS-6 W Main drive Runoff Area=38,987 sf 52.87% Impervious Runoff Depth=4.90"
Flow Length=504' Tc=9.5 min CN=87 Runoff=4.43 cfs 0.366 af

SubcatchmentPWS-7: PWS-7 E Baseball Runoff Area=157,633 sf 0.95% Impervious Runoff Depth=3.42"
Flow Length=562' Tc=16.5 min CN=73 Runoff=10.60 cfs 1.032 af

SubcatchmentPWS-8: PWS-8 W Baseball Runoff Area=140,196 sf 4.41% Impervious Runoff Depth=3.52"
Flow Length=248' Tc=11.7 min CN=74 Runoff=11.03 cfs 0.945 af

SubcatchmentPWS-9: PWS-9 W Parking & Runoff Area=82,387 sf 71.65% Impervious Runoff Depth=5.35"
Flow Length=575' Tc=11.0 min CN=91 Runoff=9.50 cfs 0.843 af

Reach 1R: B4-03-DMH to B4-08-DMH Avg. Flow Depth=0.83' Max Vel=6.20 fps Inflow=6.24 cfs 1.912 af
18.0" Round Pipe n=0.013 L=239.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=6.24 cfs 1.912 af

Reach 2R: B4-08-DMH to B4-11-DMH Avg. Flow Depth=1.21' Max Vel=7.47 fps Inflow=13.28 cfs 3.261 af
21.0" Round Pipe n=0.013 L=492.0' S=0.0103 '/' Capacity=16.08 cfs Outflow=13.25 cfs 3.261 af

Reach 3R: B3-12-DMH to outfall Avg. Flow Depth=0.74' Max Vel=13.76 fps Inflow=14.61 cfs 3.522 af
24.0" Round Pipe n=0.011 L=130.0' S=0.0346 '/' Capacity=49.74 cfs Outflow=14.61 cfs 3.522 af

Reach 4R: C2-02-DMH to C2-03-DMH Avg. Flow Depth=0.92' Max Vel=7.82 fps Inflow=7.59 cfs 1.257 af
15.0" Round Pipe n=0.013 L=84.0' S=0.0173 '/' Capacity=8.49 cfs Outflow=7.59 cfs 1.257 af

Reach 5R: C2-03-DMH to C2-04-DMH Avg. Flow Depth=0.74' Max Vel=10.00 fps Inflow=7.59 cfs 1.257 af
15.0" Round Pipe n=0.013 L=190.0' S=0.0316 '/' Capacity=11.48 cfs Outflow=7.59 cfs 1.257 af

Pond 1P: Wetland Replication Peak Elev=377.43' Storage=6,828 cf Inflow=9.86 cfs 1.084 af
Outflow=9.41 cfs 0.961 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=308.74' Storage=8,416 cf Inflow=24.65 cfs 4.554 af
Primary=19.57 cfs 4.540 af Secondary=1.37 cfs 0.015 af Outflow=20.94 cfs 4.554 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=312.92' Storage=1,658 cf Inflow=18.10 cfs 2.203 af
Primary=17.66 cfs 2.192 af Secondary=0.00 cfs 0.000 af Outflow=17.66 cfs 2.192 af

Pond BMP-1: BMP-1 Peak Elev=374.47' Storage=26,379 cf Inflow=24.06 cfs 1.913 af
Outflow=6.24 cfs 1.912 af

Pond BMP-2: BMP-2 Peak Elev=373.40' Storage=11,956 cf Inflow=15.95 cfs 1.349 af
Outflow=7.23 cfs 1.349 af

Pond BMP-3: BMP-3 Peak Elev=358.27' Storage=26,651 cf Inflow=19.15 cfs 1.475 af
15.0" Round Culvert n=0.013 L=18.0' S=0.0100 '/' Outflow=7.59 cfs 1.257 af

Pond BMP-4: BMP-4 Peak Elev=335.98' Storage=21,634 cf Inflow=28.34 cfs 2.453 af
24.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=18.73 cfs 2.392 af

Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road Inflow=105.73 cfs 14.077 af
Primary=105.73 cfs 14.077 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=0.78 cfs 0.063 af
Primary=0.78 cfs 0.063 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=10.59 cfs 1.051 af
Primary=10.59 cfs 1.051 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=8.10 cfs 0.664 af
Primary=8.10 cfs 0.664 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=9.88 cfs 0.850 af
Primary=9.88 cfs 0.850 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=2.66 cfs 0.237 af
Primary=2.66 cfs 0.237 af

Link POA-9: POA-9 Residences Inflow=0.45 cfs 0.037 af
Primary=0.45 cfs 0.037 af

Total Runoff Area = 46.730 ac Runoff Volume = 17.393 af Average Runoff Depth = 4.47"
62.70% Pervious = 29.299 ac 37.30% Impervious = 17.431 ac

Summary for Subcatchment PWS-1: PWS-1 Loading

Runoff = 8.07 cfs @ 12.08 hrs, Volume= 0.605 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-10: PWS-10 NE corner (Fields)

Runoff = 0.45 cfs @ 12.15 hrs, Volume= 0.037 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
6,269	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,269	70	Weighted Average
6,269		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-11: PWS-11 SE edge

Runoff = 1.17 cfs @ 12.12 hrs, Volume= 0.090 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
1,211	74	>75% Grass cover, Good, HSG C
13,911	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
15,122	70	Weighted Average
15,122		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0540	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-12: PWS-12 E to wetland replication

Runoff = 4.00 cfs @ 12.39 hrs, Volume= 0.479 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
35,208	74	>75% Grass cover, Good, HSG C
27,704	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,160	98	Water Surface, HSG C
69,072	75	Weighted Average
62,912		91.08% Pervious Area
6,160		8.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
14.1	501	0.0140	0.59		**Shallow Concentrated Flow, SCF 258 FT** Woodland Kv= 5.0 fps
27.0	551	Total			

Summary for Subcatchment PWS-13: PWS-13 NE corner

Runoff = 2.66 cfs @ 12.18 hrs, Volume= 0.237 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
3,912	74	>75% Grass cover, Good, HSG C
35,761	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
39,673	70	Weighted Average
39,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
2.4	134	0.0360	0.95		**Shallow Concentrated Flow, SCF 134 FT WOODS** Woodland Kv= 5.0 fps
12.9	184	Total			

Summary for Subcatchment PWS-14: PWS-14 N Bldg

Runoff = 15.99 cfs @ 12.08 hrs, Volume= 1.308 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	110,964	98	Roof, HSG C
	110,964		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-15: PWS-15 S Bldg (minus 20K to recharge)

Runoff = 5.69 cfs @ 12.08 hrs, Volume= 0.465 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	39,471	98	Roof, HSG C
	39,471		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-16: PWS-16 "D-Series" Wetland Tributary

Runoff = 8.10 cfs @ 12.14 hrs, Volume= 0.664 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
82,594	77	Woods, Good, HSG D
5,578	96	Gravel surface, HSG D
88,172	78	Weighted Average
88,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment PWS-17: PWS-17 CB at top of paved access drive

Runoff = 1.78 cfs @ 12.08 hrs, Volume= 0.132 af, Depth= 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
7,868	98	Paved parking, HSG C
5,847	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
13,715	88	Weighted Average
5,847		42.63% Pervious Area
7,868		57.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-18: PWS-18 Tri-County Drive Tributary

Runoff = 9.88 cfs @ 12.14 hrs, Volume= 0.836 af, Depth= 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
51,279	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
27,700	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
87,171	88	Weighted Average
32,014		36.73% Pervious Area
55,157		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment PWS-19: PWS-19 S of Central Parking

Runoff = 0.78 cfs @ 12.14 hrs, Volume= 0.063 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
6,122	74	>75% Grass cover, Good, HSG C
3,848	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
9,970	72	Weighted Average
9,970		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	128	0.0700	1.32		**Shallow Concentrated Flow, SCF 128 FT** Woodland Kv= 5.0 fps
10.1	178	Total			

Summary for Subcatchment PWS-2: PWS-2 Parking S of Bldg

Runoff = 10.33 cfs @ 12.10 hrs, Volume= 0.883 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
	43,283	98	Paved parking, HSG C
*	31,659	98	>75% Grass cover, Good, HSG C
	74,942	98	Weighted Average
	74,942		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0144	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	33	0.0360	1.33		**Shallow Concentrated Flow, SCF 33 FT** Short Grass Pasture Kv= 7.0 fps
0.5	51	0.0060	1.57		**Shallow Concentrated Flow, SCF 51 FT** Paved Kv= 20.3 fps
7.3	134	Total			

Summary for Subcatchment PWS-20: PWS-20 CB at top of driveway

Runoff = 1.73 cfs @ 12.08 hrs, Volume= 0.129 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
8,427	98	Paved parking, HSG C
4,499	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
12,926	90	Weighted Average
4,499		34.81% Pervious Area
8,427		65.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-21: PWS-21 Tri-County Drive to CB

Runoff = 1.10 cfs @ 12.08 hrs, Volume= 0.090 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
7,624	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
7,624	98	Weighted Average
7,624		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-22: PWS-22 Bldg to recharge

Runoff = 2.88 cfs @ 12.08 hrs, Volume= 0.236 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	20,000	98	Roof, HSG C
	20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-23: PWS-23 Loading Area and Shed to wetland replication

Runoff = 8.07 cfs @ 12.08 hrs, Volume= 0.605 af, Depth= 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-3: PWS-3 Central Parking

Runoff = 16.27 cfs @ 12.08 hrs, Volume= 1.239 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	90,299	98	Paved parking & bldg, HSG C
	28,232	74	>75% Grass cover, Good, HSG C
	118,531	92	Weighted Average
	28,232		23.82% Pervious Area
	90,299		76.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-4: PWS-4 N Central Parking

Runoff = 14.46 cfs @ 12.15 hrs, Volume= 1.245 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	69,719	98	Paved parking & bldg, HSG C
	66,081	74	>75% Grass cover, Good, HSG C
	135,800	86	Weighted Average
	66,081		48.66% Pervious Area
	69,719		51.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	41	0.0480	1.53		**Shallow Concentrated Flow, SCF 41 FT** Short Grass Pasture Kv= 7.0 fps
0.3	65	0.0310	3.57		**Shallow Concentrated Flow, SCF 65 FT** Paved Kv= 20.3 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
11.0	156	Total			

Summary for Subcatchment PWS-5: PWS-5 Play Fields

Runoff = 52.45 cfs @ 12.20 hrs, Volume= 4.864 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
*	103,282	98	Paved parking & bldg, HSG C
	463,146	74	>75% Grass cover, Good, HSG C
	65,535	70	Woods, Good, HSG C
	14,261	87	Dirt roads, HSG C
	646,224	78	Weighted Average
	542,942		84.02% Pervious Area
	103,282		15.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0120	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
6.4	514	0.0370	1.35		**Shallow Concentrated Flow, SCF 514 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
14.5	1,344	Total			

Summary for Subcatchment PWS-6: PWS-6 W Main drive

Runoff = 4.43 cfs @ 12.13 hrs, Volume= 0.366 af, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
20,613	98	Paved parking, HSG C
18,374	74	>75% Grass cover, Good, HSG C
38,987	87	Weighted Average
18,374		47.13% Pervious Area
20,613		52.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	198	0.0680	1.83		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
1.2	256	0.0300	3.52		**Shallow Concentrated Flow, SCF 256 FT** Paved Kv= 20.3 fps
9.5	504	Total			

Summary for Subcatchment PWS-7: PWS-7 E Baseball & Wetland Tributary

Runoff = 10.60 cfs @ 12.23 hrs, Volume= 1.032 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
1,497	98	Paved parking, HSG C
83,000	74	>75% Grass cover, Good, HSG C
67,324	70	Woods, Good, HSG C
5,812	87	Dirt roads, HSG C
157,633	73	Weighted Average
156,136		99.05% Pervious Area
1,497		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
7.3	258	0.0070	0.59		**Shallow Concentrated Flow, SCF 258 FT** Short Grass Pasture Kv= 7.0 fps
2.4	254	0.1230	1.75		**Shallow Concentrated Flow, SCF 254 FT** Woodland Kv= 5.0 fps
0.3					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
16.5	562	Total			

Summary for Subcatchment PWS-8: PWS-8 W Baseball & Wetland Tributary

Runoff = 11.03 cfs @ 12.16 hrs, Volume= 0.945 af, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
6,188	98	Paved parking, HSG C
60,836	74	>75% Grass cover, Good, HSG C
67,878	70	Woods, Good, HSG C
5,294	87	Dirt roads, HSG C
140,196	74	Weighted Average
134,008		95.59% Pervious Area
6,188		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	198	0.0100	0.70		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
11.7	248	Total			

Summary for Subcatchment PWS-9: PWS-9 W Parking & SW football field

Runoff = 9.50 cfs @ 12.15 hrs, Volume= 0.843 af, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
59,027	98	Paved parking, HSG C
23,360	74	>75% Grass cover, Good, HSG C
82,387	91	Weighted Average
23,360		28.35% Pervious Area
59,027		71.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0110	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.9	120	0.1090	2.31		**Shallow Concentrated Flow, SCF 120 FT** Short Grass Pasture Kv= 7.0 fps
3.0	405	0.0120	2.22		**Shallow Concentrated Flow, SCF 405 FT** Paved Kv= 20.3 fps
11.0	575	Total			

Summary for Reach 1R: B4-03-DMH to B4-08-DMH

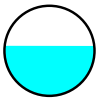
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-1 Primary device # 1 OUTLET by 0.73'

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 5.83" for 25-year event
Inflow = 6.24 cfs @ 12.44 hrs, Volume= 1.912 af
Outflow = 6.24 cfs @ 12.46 hrs, Volume= 1.912 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.20 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 2.6 min

Peak Storage= 240 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 239.0' Slope= 0.0100 '/'
Inlet Invert= 369.10', Outlet Invert= 366.71'



Stage-Area-Storage for Reach 1R: B4-03-DMH to B4-08-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
369.10	0.0	0
369.12	0.0	1
369.14	0.0	3
369.16	0.0	6
369.18	0.0	9
369.20	0.1	12
369.22	0.1	16
369.24	0.1	20
369.26	0.1	24
369.28	0.1	29
369.30	0.1	33
369.32	0.2	38
369.34	0.2	44
369.36	0.2	49
369.38	0.2	54
369.40	0.3	60
369.42	0.3	66
369.44	0.3	72
369.46	0.3	78
369.48	0.4	84
369.50	0.4	90
369.52	0.4	97
369.54	0.4	103
369.56	0.5	110
369.58	0.5	117
369.60	0.5	123
369.62	0.5	130
369.64	0.6	137
369.66	0.6	144
369.68	0.6	151
369.70	0.7	158
369.72	0.7	165
369.74	0.7	172
369.76	0.7	179
369.78	0.8	186
369.80	0.8	193
369.82	0.8	200
369.84	0.9	208
369.86	0.9	215
369.88	0.9	222
369.90	1.0	229
369.92	1.0	236
369.94	1.0	243
369.96	1.0	250
369.98	1.1	258
370.00	1.1	265
370.02	1.1	272
370.04	1.2	279
370.06	1.2	285
370.08	1.2	292
370.10	1.3	299
370.12	1.3	306
370.14	1.3	312
370.16	1.3	319
370.18	1.4	326
370.20	1.4	332
370.22	1.4	338
370.24	1.4	344
370.26	1.5	350
370.28	1.5	356
370.30	1.5	362
370.32	1.5	368
370.34	1.6	373
370.36	1.6	379
370.38	1.6	384
370.40	1.6	389
370.42	1.6	394
370.44	1.7	398
370.46	1.7	402
370.48	1.7	407
370.50	1.7	410
370.52	1.7	414
370.54	1.7	417
370.56	1.8	419
370.58	1.8	421
370.60	**1.8**	**422**

Summary for Reach 2R: B4-08-DMH to B4-11-DMH

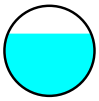
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 1R outlet invert by 0.42' @ 12.31 hrs
[79] Warning: Submerged Pond BMP-2 Primary device # 1 OUTLET by 0.88'

Inflow Area = 6.560 ac, 92.53% Impervious, Inflow Depth = 5.97" for 25-year event
Inflow = 13.28 cfs @ 12.29 hrs, Volume= 3.261 af
Outflow = 13.25 cfs @ 12.33 hrs, Volume= 3.261 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.47 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 4.7 min

Peak Storage= 873 cf @ 12.31 hrs
Average Depth at Peak Storage= 1.21'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 16.08 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 492.0' Slope= 0.0103 '/'
Inlet Invert= 365.92', Outlet Invert= 360.85'



Stage-Area-Storage for Reach 2R: B4-08-DMH to B4-11-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
365.92	0.0	0	366.96	1.5	733
365.94	0.0	3	366.98	1.5	750
365.96	0.0	7	367.00	1.6	767
365.98	0.0	13	367.02	1.6	783
366.00	0.0	19	367.04	1.6	800
366.02	0.1	27	367.06	1.7	816
366.04	0.1	35	367.08	1.7	833
366.06	0.1	44	367.10	1.7	849
366.08	0.1	54	367.12	1.8	865
366.10	0.1	64	367.14	1.8	881
366.12	0.2	75	367.16	1.8	897
366.14	0.2	86	367.18	1.9	912
366.16	0.2	98	367.20	1.9	928
366.18	0.2	110	367.22	1.9	943
366.20	0.2	122	367.24	1.9	958
366.22	0.3	135	367.26	2.0	972
366.24	0.3	148	367.28	2.0	987
366.26	0.3	162	367.30	2.0	1,001
366.28	0.4	175	367.32	2.1	1,015
366.30	0.4	189	367.34	2.1	1,029
366.32	0.4	204	367.36	2.1	1,042
366.34	0.4	218	367.38	2.1	1,055
366.36	0.5	233	367.40	2.2	1,067
366.38	0.5	248	367.42	2.2	1,080
366.40	0.5	264	367.44	2.2	1,092
366.42	0.6	279	367.46	2.2	1,103
366.44	0.6	295	367.48	2.3	1,114
366.46	0.6	310	367.50	2.3	1,124
366.48	0.7	326	367.52	2.3	1,134
366.50	0.7	343	367.54	2.3	1,144
366.52	0.7	359	367.56	2.3	1,152
366.54	0.8	375	367.58	2.4	1,160
366.56	0.8	392	367.60	2.4	1,168
366.58	0.8	408	367.62	2.4	1,174
366.60	0.9	425	367.64	2.4	1,179
366.62	0.9	442	367.66	**2.4**	**1,182**
366.64	0.9	459			
366.66	1.0	476			
366.68	1.0	493			
366.70	1.0	510			
366.72	1.1	527			
366.74	1.1	544			
366.76	1.1	562			
366.78	1.2	579			
366.80	1.2	596			
366.82	1.2	613			
366.84	1.3	630			
366.86	1.3	648			
366.88	1.4	665			
366.90	1.4	682			
366.92	1.4	699			
366.94	1.5	716			

Summary for Reach 3R: B3-12-DMH to outfall

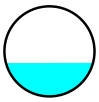
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 7.171 ac, 89.86% Impervious, Inflow Depth = 5.89" for 25-year event
Inflow = 14.61 cfs @ 12.31 hrs, Volume= 3.522 af
Outflow = 14.61 cfs @ 12.31 hrs, Volume= 3.522 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 13.76 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.15 fps, Avg. Travel Time= 0.7 min

Peak Storage= 138 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.74'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 49.74 cfs

24.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 130.0' Slope= 0.0346 '/'
Inlet Invert= 352.30', Outlet Invert= 347.80'



Stage-Area-Storage for Reach 3R: B3-12-DMH to outfall

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
352.30	0.0	0	353.34	1.7	215
352.32	0.0	1	353.36	1.7	220
352.34	0.0	2	353.38	1.7	225
352.36	0.0	4	353.40	1.8	230
352.38	0.0	5	353.42	1.8	235
352.40	0.1	8	353.44	1.8	240
352.42	0.1	10	353.46	1.9	246
352.44	0.1	13	353.48	1.9	251
352.46	0.1	15	353.50	2.0	256
352.48	0.1	18	353.52	2.0	261
352.50	0.2	21	353.54	2.0	266
352.52	0.2	24	353.56	2.1	271
352.54	0.2	28	353.58	2.1	276
352.56	0.2	31	353.60	2.2	281
352.58	0.3	35	353.62	2.2	286
352.60	0.3	38	353.64	2.2	291
352.62	0.3	42	353.66	2.3	296
352.64	0.4	46	353.68	2.3	301
352.66	0.4	50	353.70	2.3	305
352.68	0.4	54	353.72	2.4	310
352.70	0.4	58	353.74	2.4	315
352.72	0.5	62	353.76	2.5	319
352.74	0.5	67	353.78	2.5	324
352.76	0.5	71	353.80	2.5	329
352.78	0.6	75	353.82	2.6	333
352.80	0.6	80	353.84	2.6	337
352.82	0.6	84	353.86	2.6	342
352.84	0.7	89	353.88	2.7	346
352.86	0.7	94	353.90	2.7	350
352.88	0.8	98	353.92	2.7	354
352.90	0.8	103	353.94	2.8	358
352.92	0.8	108	353.96	2.8	362
352.94	0.9	113	353.98	2.8	366
352.96	0.9	118	354.00	2.8	370
352.98	0.9	122	354.02	2.9	374
353.00	1.0	127	354.04	2.9	377
353.02	1.0	132	354.06	2.9	381
353.04	1.1	137	354.08	3.0	384
353.06	1.1	142	354.10	3.0	387
353.08	1.1	147	354.12	3.0	390
353.10	1.2	153	354.14	3.0	393
353.12	1.2	158	354.16	3.0	396
353.14	1.3	163	354.18	3.1	398
353.16	1.3	168	354.20	3.1	401
353.18	1.3	173	354.22	3.1	403
353.20	1.4	178	354.24	3.1	405
353.22	1.4	183	354.26	3.1	406
353.24	1.5	189	354.28	3.1	408
353.26	1.5	194	354.30	**3.1**	**408**
353.28	1.5	199			
353.30	1.6	204			
353.32	1.6	209			

Summary for Reach 4R: C2-02-DMH to C2-03-DMH

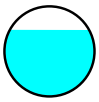
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond BMP-3 Primary device # 1 INLET by 0.62'

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 4.74" for 25-year event
Inflow = 7.59 cfs @ 12.30 hrs, Volume= 1.257 af
Outflow = 7.59 cfs @ 12.31 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.82 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 0.9 min

Peak Storage= 82 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.49 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 84.0' Slope= 0.0173 '/'
Inlet Invert= 355.70', Outlet Invert= 354.25'



Stage-Area-Storage for Reach 4R: C2-02-DMH to C2-03-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
355.70	0.0	0	356.74	1.1	92
355.72	0.0	0	356.76	1.1	93
355.74	0.0	1	356.78	1.1	95
355.76	0.0	2	356.80	1.1	96
355.78	0.0	3	356.82	1.2	97
355.80	0.0	4	356.84	1.2	99
355.82	0.1	5	356.86	1.2	100
355.84	0.1	6	356.88	1.2	101
355.86	0.1	8	356.90	1.2	102
355.88	0.1	9	356.92	1.2	102
355.90	0.1	11	356.94	**1.2**	**103**
355.92	0.1	12			
355.94	0.2	14			
355.96	0.2	16			
355.98	0.2	17			
356.00	0.2	19			
356.02	0.2	21			
356.04	0.3	23			
356.06	0.3	25			
356.08	0.3	26			
356.10	0.3	28			
356.12	0.4	30			
356.14	0.4	32			
356.16	0.4	34			
356.18	0.4	36			
356.20	0.5	39			
356.22	0.5	41			
356.24	0.5	43			
356.26	0.5	45			
356.28	0.6	47			
356.30	0.6	49			
356.32	0.6	51			
356.34	0.6	53			
356.36	0.7	55			
356.38	0.7	57			
356.40	0.7	59			
356.42	0.7	61			
356.44	0.8	64			
356.46	0.8	66			
356.48	0.8	68			
356.50	0.8	70			
356.52	0.9	72			
356.54	0.9	74			
356.56	0.9	76			
356.58	0.9	78			
356.60	0.9	79			
356.62	1.0	81			
356.64	1.0	83			
356.66	1.0	85			
356.68	1.0	87			
356.70	1.1	88			
356.72	1.1	90			

Summary for Reach 5R: C2-03-DMH to C2-04-DMH

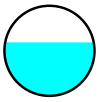
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 4R outlet invert by 0.49' @ 12.31 hrs

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 4.74" for 25-year event
Inflow = 7.59 cfs @ 12.31 hrs, Volume= 1.257 af
Outflow = 7.59 cfs @ 12.32 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.00 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.6 min

Peak Storage= 144 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.74'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 11.48 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 190.0' Slope= 0.0316 '/'
Inlet Invert= 354.00', Outlet Invert= 348.00'



Stage-Area-Storage for Reach 5R: C2-03-DMH to C2-04-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
354.00	0.0	0	355.04	1.1	207
354.02	0.0	1	355.06	1.1	211
354.04	0.0	2	355.08	1.1	214
354.06	0.0	4	355.10	1.1	217
354.08	0.0	6	355.12	1.2	220
354.10	0.0	9	355.14	1.2	223
354.12	0.1	11	355.16	1.2	226
354.14	0.1	14	355.18	1.2	228
354.16	0.1	17	355.20	1.2	230
354.18	0.1	21	355.22	1.2	232
354.20	0.1	24	355.24	**1.2**	**233**
354.22	0.1	28			
354.24	0.2	31			
354.26	0.2	35			
354.28	0.2	39			
354.30	0.2	43			
354.32	0.2	47			
354.34	0.3	51			
354.36	0.3	56			
354.38	0.3	60			
354.40	0.3	64			
354.42	0.4	69			
354.44	0.4	73			
354.46	0.4	78			
354.48	0.4	82			
354.50	0.5	87			
354.52	0.5	92			
354.54	0.5	96			
354.56	0.5	101			
354.58	0.6	106			
354.60	0.6	111			
354.62	0.6	115			
354.64	0.6	120			
354.66	0.7	125			
354.68	0.7	130			
354.70	0.7	134			
354.72	0.7	139			
354.74	0.8	144			
354.76	0.8	148			
354.78	0.8	153			
354.80	0.8	158			
354.82	0.9	162			
354.84	0.9	167			
354.86	0.9	171			
354.88	0.9	175			
354.90	0.9	180			
354.92	1.0	184			
354.94	1.0	188			
354.96	1.0	192			
354.98	1.0	196			
355.00	1.1	200			
355.02	1.1	204			

Summary for Pond 1P: Wetland Replication

Inflow Area = 2.971 ac, 34.91% Impervious, Inflow Depth = 4.38" for 25-year event
Inflow = 9.86 cfs @ 12.09 hrs, Volume= 1.084 af
Outflow = 9.41 cfs @ 12.12 hrs, Volume= 0.961 af, Atten= 5%, Lag= 1.8 min
Primary = 9.41 cfs @ 12.12 hrs, Volume= 0.961 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.43' @ 12.12 hrs Surf.Area= 8,677 sf Storage= 6,828 cf

Plug-Flow detention time= 87.8 min calculated for 0.961 af (89% of inflow)
Center-of-Mass det. time= 34.1 min (843.5 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	376.50'	7,475 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.50	6,160	400.0	0	0	6,160
377.00	7,440	495.0	3,395	3,395	12,930
377.50	8,900	515.0	4,080	7,475	14,557

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=9.41 cfs @ 12.12 hrs HW=377.43' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 9.41 cfs @ 1.07 fps)

Stage-Area-Storage for Pond 1P: Wetland Replication

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.50	6,160	0	377.02	7,496	3,544
376.51	6,184	62	377.03	7,524	3,619
376.52	6,209	124	377.04	7,552	3,695
376.53	6,233	186	377.05	7,580	3,770
376.54	6,258	248	377.06	7,608	3,846
376.55	6,283	311	377.07	7,637	3,923
376.56	6,307	374	377.08	7,665	3,999
376.57	6,332	437	377.09	7,693	4,076
376.58	6,357	501	377.10	7,722	4,153
376.59	6,381	564	377.11	7,750	4,230
376.60	6,406	628	377.12	7,778	4,308
376.61	6,431	692	377.13	7,807	4,386
376.62	6,456	757	377.14	7,836	4,464
376.63	6,481	822	377.15	7,864	4,543
376.64	6,506	887	377.16	7,893	4,621
376.65	6,531	952	377.17	7,922	4,701
376.66	6,556	1,017	377.18	7,951	4,780
376.67	6,582	1,083	377.19	7,979	4,860
376.68	6,607	1,149	377.20	8,008	4,939
376.69	6,632	1,215	377.21	8,037	5,020
376.70	6,658	1,281	377.22	8,066	5,100
376.71	6,683	1,348	377.23	8,095	5,181
376.72	6,708	1,415	377.24	8,124	5,262
376.73	6,734	1,482	377.25	8,154	5,343
376.74	6,759	1,550	377.26	8,183	5,425
376.75	6,785	1,617	377.27	8,212	5,507
376.76	6,811	1,685	377.28	8,241	5,589
376.77	6,836	1,754	377.29	8,271	5,672
376.78	6,862	1,822	377.30	8,300	5,755
376.79	6,888	1,891	377.31	8,330	5,838
376.80	6,914	1,960	377.32	8,359	5,921
376.81	6,939	2,029	377.33	8,389	6,005
376.82	6,965	2,099	377.34	8,419	6,089
376.83	6,991	2,169	377.35	8,448	6,174
376.84	7,017	2,239	377.36	8,478	6,258
376.85	7,043	2,309	377.37	8,508	6,343
376.86	7,069	2,379	377.38	8,538	6,428
376.87	7,096	2,450	377.39	8,568	6,514
376.88	7,122	2,521	377.40	8,598	6,600
376.89	7,148	2,593	377.41	8,628	6,686
376.90	7,174	2,664	377.42	8,658	6,772
376.91	7,201	2,736	377.43	8,688	6,859
376.92	7,227	2,808	377.44	8,718	6,946
376.93	7,254	2,881	377.45	8,748	7,033
376.94	7,280	2,953	377.46	8,778	7,121
376.95	7,307	3,026	377.47	8,809	7,209
376.96	7,333	3,100	377.48	8,839	7,297
376.97	7,360	3,173	377.49	8,870	7,386
376.98	7,386	3,247	377.50	**8,900**	**7,475**
376.99	7,413	3,321			
377.00	7,440	3,395			
377.01	7,468	3,470			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 10.790 ac, 60.04% Impervious, Inflow Depth = 5.07" for 25-year event
Inflow = 24.65 cfs @ 12.26 hrs, Volume= 4.554 af
Outflow = 20.94 cfs @ 12.43 hrs, Volume= 4.554 af, Atten= 15%, Lag= 10.0 min
Primary = 19.57 cfs @ 12.43 hrs, Volume= 4.540 af
Secondary = 1.37 cfs @ 12.43 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 308.74' @ 12.43 hrs Surf.Area= 3,533 sf Storage= 8,416 cf

Plug-Flow detention time= 2.2 min calculated for 4.554 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (821.9 - 819.6)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=19.57 cfs @ 12.43 hrs HW=308.74' (Free Discharge)
↑**1=Culvert** (Inlet Controls 19.57 cfs @ 11.08 fps)

Secondary OutFlow Max=1.34 cfs @ 12.43 hrs HW=308.74' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.34 cfs @ 0.95 fps)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 6.399 ac, 41.79% Impervious, Inflow Depth = 4.13" for 25-year event
Inflow = 18.10 cfs @ 12.18 hrs, Volume= 2.203 af
Outflow = 17.66 cfs @ 12.21 hrs, Volume= 2.192 af, Atten= 2%, Lag= 2.0 min
Primary = 17.66 cfs @ 12.21 hrs, Volume= 2.192 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 312.92' @ 12.21 hrs Surf.Area= 1,871 sf Storage= 1,658 cf

Plug-Flow detention time= 10.7 min calculated for 2.191 af (99% of inflow)
Center-of-Mass det. time= 2.9 min (865.8 - 862.9)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=17.65 cfs @ 12.21 hrs HW=312.92' (Free Discharge)
└**1=Culvert** (Inlet Controls 17.65 cfs @ 4.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Pond BMP-1: BMP-1

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 5.84" for 25-year event
Inflow = 24.06 cfs @ 12.08 hrs, Volume= 1.913 af
Outflow = 6.24 cfs @ 12.44 hrs, Volume= 1.912 af, Atten= 74%, Lag= 21.6 min
Primary = 6.24 cfs @ 12.44 hrs, Volume= 1.912 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 374.47' @ 12.44 hrs Surf.Area= 9,552 sf Storage= 26,379 cf

Plug-Flow detention time= 77.8 min calculated for 1.912 af (100% of inflow)
Center-of-Mass det. time= 78.0 min (834.4 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	371.25'	0 cf	**48.27'W x 197.88'L x 4.67'H Field A** 44,574 cf Overall - 44,574 cf Embedded = 0 cf x 40.0% Voids
#2A	371.25'	32,781 cf	**StormTrap ST1 SingleTrap 4-0** x 98 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 98 Chambers in 7 Rows 48.27' x 196.88' Core + 0.00' x 0.50' Border = 48.27' x 197.88' System
		32,781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	371.25'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 371.25' / 369.20' S= 0.0131 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	371.25'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	374.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.24 cfs @ 12.44 hrs HW=374.47' (Free Discharge)
└**1=Culvert** (Passes 6.24 cfs of 13.17 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 6.24 cfs @ 7.94 fps)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BMP-1: BMP-1 - Chamber Wizard Field A

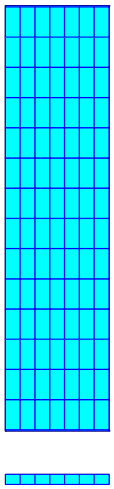
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

14 Chambers/Row x 14.06' Long = 196.88' Row Length +6.0" Border x 2 = 197.88' Base Length
7 Rows x 82.7" Wide = 48.27' Base Width
56.0" Chamber Height = 4.67' Field Height

98 Chambers x 334.5 cf = 32,781.1 cf Chamber Storage
98 Chambers x 452.5 cf + 225.3 cf Border = 44,574.1 cf Displacement

Chamber Storage = 32,781.1 cf = 0.753 af
Overall Storage Efficiency = 73.5%
Overall System Size = 197.88' x 48.27' x 4.67'

98 Chambers (plus border)
1,650.9 cy Field



Stage-Area-Storage for Pond BMP-1: BMP-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
371.25	0	373.85	21,308
371.30	410	373.90	21,718
371.35	820	373.95	22,127
371.40	1,229	374.00	22,537
371.45	1,639	374.05	22,947
371.50	2,049	374.10	23,357
371.55	2,459	374.15	23,766
371.60	2,868	374.20	24,176
371.65	3,278	374.25	24,586
371.70	3,688	374.30	24,996
371.75	4,098	374.35	25,405
371.80	4,507	374.40	25,815
371.85	4,917	374.45	26,225
371.90	5,327	374.50	26,635
371.95	5,737	374.55	27,044
372.00	6,146	374.60	27,454
372.05	6,556	374.65	27,864
372.10	6,966	374.70	28,274
372.15	7,376	374.75	28,683
372.20	7,786	374.80	29,093
372.25	8,195	374.85	29,503
372.30	8,605	374.90	29,913
372.35	9,015	374.95	30,323
372.40	9,425	375.00	30,732
372.45	9,834	375.05	31,142
372.50	10,244	375.10	31,552
372.55	10,654	375.15	31,962
372.60	11,064	375.20	32,371
372.65	11,473	375.25	32,781
372.70	11,883	375.30	32,781
372.75	12,293	375.35	32,781
372.80	12,703	375.40	32,781
372.85	13,112	375.45	32,781
372.90	13,522	375.50	32,781
372.95	13,932	375.55	32,781
373.00	14,342	375.60	32,781
373.05	14,752	375.65	32,781
373.10	15,161	375.70	32,781
373.15	15,571	375.75	32,781
373.20	15,981	375.80	32,781
373.25	16,391	375.85	32,781
373.30	16,800	375.90	**32,781**
373.35	17,210		
373.40	17,620		
373.45	18,030		
373.50	18,439		
373.55	18,849		
373.60	19,259		
373.65	19,669		
373.70	20,078		
373.75	20,488		
373.80	20,898		

Summary for Pond BMP-2: BMP-2

Inflow Area = 2.627 ac,100.00% Impervious, Inflow Depth = 6.16" for 25-year event
Inflow = 15.95 cfs @ 12.09 hrs, Volume= 1.349 af
Outflow = 7.23 cfs @ 12.28 hrs, Volume= 1.349 af, Atten= 55%, Lag= 11.2 min
Primary = 7.23 cfs @ 12.28 hrs, Volume= 1.349 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 373.40' @ 12.28 hrs Surf.Area= 4,114 sf Storage= 11,956 cf

Plug-Flow detention time= 36.1 min calculated for 1.349 af (100% of inflow)
Center-of-Mass det. time= 36.0 min (781.0 - 745.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	0 cf	**41.38'W x 99.44'L x 4.67'H Field A** 19,200 cf Overall - 19,200 cf Embedded = 0 cf x 40.0% Voids
#2A	370.00'	14,049 cf	**StormTrap ST1 SingleTrap 4-0** x 42 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 42 Chambers in 6 Rows 41.38' x 98.44' Core + 0.00' x 0.50' Border = 41.38' x 99.44' System
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	370.00'	**21.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.00' / 366.25' S= 0.0528 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	370.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	373.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.23 cfs @ 12.28 hrs HW=373.40' (Free Discharge)
└**1=Culvert** (Passes 7.23 cfs of 18.42 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 6.44 cfs @ 8.21 fps)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.78 cfs @ 1.28 fps)

Pond BMP-2: BMP-2 - Chamber Wizard Field A

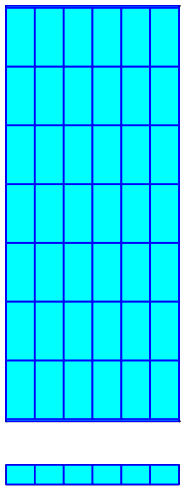
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

7 Chambers/Row x 14.06' Long = 98.44' Row Length +6.0" Border x 2 = 99.44' Base Length
6 Rows x 82.7" Wide = 41.38' Base Width
56.0" Chamber Height = 4.67' Field Height

42 Chambers x 334.5 cf = 14,049.1 cf Chamber Storage
42 Chambers x 452.5 cf + 193.1 cf Border = 19,199.7 cf Displacement

Chamber Storage = 14,049.1 cf = 0.323 af
Overall Storage Efficiency = 73.2%
Overall System Size = 99.44' x 41.38' x 4.67'

42 Chambers (plus border)
711.1 cy Field



Stage-Area-Storage for Pond BMP-2: BMP-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
370.00	0	372.60	9,132
370.05	176	372.65	9,308
370.10	351	372.70	9,483
370.15	527	372.75	9,659
370.20	702	372.80	9,834
370.25	878	372.85	10,010
370.30	1,054	372.90	10,186
370.35	1,229	372.95	10,361
370.40	1,405	373.00	10,537
370.45	1,581	373.05	10,712
370.50	1,756	373.10	10,888
370.55	1,932	373.15	11,064
370.60	2,107	373.20	11,239
370.65	2,283	373.25	11,415
370.70	2,459	373.30	11,590
370.75	2,634	373.35	11,766
370.80	2,810	373.40	11,942
370.85	2,985	373.45	12,117
370.90	3,161	373.50	12,293
370.95	3,337	373.55	12,469
371.00	3,512	373.60	12,644
371.05	3,688	373.65	12,820
371.10	3,863	373.70	12,995
371.15	4,039	373.75	13,171
371.20	4,215	373.80	13,347
371.25	4,390	373.85	13,522
371.30	4,566	373.90	13,698
371.35	4,742	373.95	13,873
371.40	4,917	374.00	14,049
371.45	5,093	374.05	14,049
371.50	5,268	374.10	14,049
371.55	5,444	374.15	14,049
371.60	5,620	374.20	14,049
371.65	5,795	374.25	14,049
371.70	5,971	374.30	14,049
371.75	6,146	374.35	14,049
371.80	6,322	374.40	14,049
371.85	6,498	374.45	14,049
371.90	6,673	374.50	14,049
371.95	6,849	374.55	14,049
372.00	7,025	374.60	14,049
372.05	7,200	374.65	**14,049**
372.10	7,376		
372.15	7,551		
372.20	7,727		
372.25	7,903		
372.30	8,078		
372.35	8,254		
372.40	8,429		
372.45	8,605		
372.50	8,781		
372.55	8,956		

Summary for Pond BMP-3: BMP-3

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 5.56" for 25-year event
Inflow = 19.15 cfs @ 12.08 hrs, Volume= 1.475 af
Outflow = 7.59 cfs @ 12.30 hrs, Volume= 1.257 af, Atten= 60%, Lag= 13.1 min
Primary = 7.59 cfs @ 12.30 hrs, Volume= 1.257 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 358.27' @ 12.30 hrs Surf.Area= 9,995 sf Storage= 26,651 cf

Plug-Flow detention time= 178.6 min calculated for 1.257 af (85% of inflow)
Center-of-Mass det. time= 115.2 min (885.5 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	354.50'	13,801 cf	**58.58'W x 170.61'L x 5.50'H Field A** 54,972 cf Overall - 20,470 cf Embedded = 34,502 cf x 40.0% Voids
#2A	355.25'	20,470 cf	**ADS_StormTech MC-3500 d +Cap**x 184 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 184 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		34,271 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	356.00'	**15.0" Round Culvert** L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 356.00' / 355.82' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.59 cfs @ 12.30 hrs HW=358.27' (Free Discharge)
1=Culvert (Inlet Controls 7.59 cfs @ 6.18 fps)

Pond BMP-3: BMP-3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

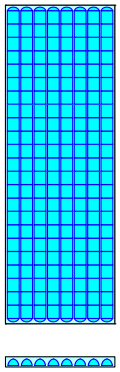
23 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 168.61' Row Length +12.0" End Stone x 2 = 170.61' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

184 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 20,469.6 cf Chamber Storage

54,972.0 cf Field - 20,469.6 cf Chambers = 34,502.4 cf Stone x 40.0% Voids = 13,801.0 cf Stone Storage

Chamber Storage + Stone Storage = 34,270.5 cf = 0.787 af
Overall Storage Efficiency = 62.3%
Overall System Size = 170.61' x 58.58' x 5.50'

184 Chambers
2,036.0 cy Field
1,277.9 cy Stone



Stage-Area-Storage for Pond BMP-3: BMP-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
354.50	0	356.58	14,233	358.66	28,798
354.54	160	356.62	14,557	358.70	28,985
354.58	320	356.66	14,881	358.74	29,168
354.62	480	356.70	15,203	358.78	29,346
354.66	640	356.74	15,524	358.82	29,521
354.70	800	356.78	15,844	358.86	29,693
354.74	960	356.82	16,163	358.90	29,863
354.78	1,119	356.86	16,480	358.94	30,029
354.82	1,279	356.90	16,797	358.98	30,192
354.86	1,439	356.94	17,112	359.02	30,353
354.90	1,599	356.98	17,426	359.06	30,512
354.94	1,759	357.02	17,739	359.10	30,672
354.98	1,919	357.06	18,050	359.14	30,832
355.02	2,079	357.10	18,361	359.18	30,992
355.06	2,239	357.14	18,669	359.22	31,152
355.10	2,399	357.18	18,977	359.26	31,312
355.14	2,559	357.22	19,283	359.30	31,472
355.18	2,719	357.26	19,587	359.34	31,632
355.22	2,879	357.30	19,890	359.38	31,792
355.26	3,085	357.34	20,191	359.42	31,952
355.30	3,433	357.38	20,491	359.46	32,112
355.34	3,780	357.42	20,789	359.50	32,272
355.38	4,127	357.46	21,085	359.54	32,431
355.42	4,473	357.50	21,380	359.58	32,591
355.46	4,819	357.54	21,673	359.62	32,751
355.50	5,164	357.58	21,964	359.66	32,911
355.54	5,508	357.62	22,253	359.70	33,071
355.58	5,852	357.66	22,540	359.74	33,231
355.62	6,196	357.70	22,825	359.78	33,391
355.66	6,538	357.74	23,108	359.82	33,551
355.70	6,881	357.78	23,389	359.86	33,711
355.74	7,222	357.82	23,667	359.90	33,871
355.78	7,563	357.86	23,944	359.94	34,031
355.82	7,904	357.90	24,218	359.98	**34,191**
355.86	8,244	357.94	24,490		
355.90	8,583	357.98	24,759		
355.94	8,921	358.02	25,025		
355.98	9,259	358.06	25,289		
356.02	9,596	358.10	25,550		
356.06	9,933	358.14	25,808		
356.10	10,269	358.18	26,064		
356.14	10,603	358.22	26,316		
356.18	10,938	358.26	26,564		
356.22	11,271	358.30	26,809		
356.26	11,604	358.34	27,051		
356.30	11,935	358.38	27,288		
356.34	12,266	358.42	27,522		
356.38	12,596	358.46	27,750		
356.42	12,925	358.50	27,973		
356.46	13,254	358.54	28,191		
356.50	13,581	358.58	28,401		
356.54	13,908	358.62	28,603		

Summary for Pond BMP-4: BMP-4

Inflow Area = 5.904 ac, 58.08% Impervious, Inflow Depth = 4.99" for 25-year event
Inflow = 28.34 cfs @ 12.14 hrs, Volume= 2.453 af
Outflow = 18.73 cfs @ 12.28 hrs, Volume= 2.392 af, Atten= 34%, Lag= 8.2 min
Primary = 18.73 cfs @ 12.28 hrs, Volume= 2.392 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 335.98' @ 12.28 hrs Surf.Area= 8,735 sf Storage= 21,634 cf

Plug-Flow detention time= 62.5 min calculated for 2.392 af (98% of inflow)
Center-of-Mass det. time= 47.8 min (841.6 - 793.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	332.50'	12,084 cf	**58.58'W x 149.10'L x 5.50'H Field A** 48,041 cf Overall - 17,831 cf Embedded = 30,211 cf x 40.0% Voids
#2A	333.25'	17,831 cf	**ADS_StormTech MC-3500 d +Cap**x 160 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 160 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		29,915 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	333.25'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 333.25' / 332.95' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=18.73 cfs @ 12.28 hrs HW=335.98' (Free Discharge)
1=Culvert (Barrel Controls 18.73 cfs @ 5.96 fps)

Pond BMP-4: BMP-4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

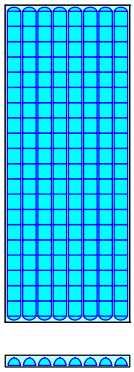
20 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 147.10' Row Length +12.0" End Stone x 2 = 149.10' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

160 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 17,830.7 cf Chamber Storage

48,041.3 cf Field - 17,830.7 cf Chambers = 30,210.6 cf Stone x 40.0% Voids = 12,084.2 cf Stone Storage

Chamber Storage + Stone Storage = 29,914.9 cf = 0.687 af
Overall Storage Efficiency = 62.3%
Overall System Size = 149.10' x 58.58' x 5.50'

160 Chambers
1,779.3 cy Field
1,118.9 cy Stone



Stage-Area-Storage for Pond BMP-4: BMP-4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
332.50	0	334.58	12,422	336.66	25,132
332.54	140	334.62	12,705	336.70	25,296
332.58	280	334.66	12,987	336.74	25,456
332.62	419	334.70	13,268	336.78	25,611
332.66	559	334.74	13,548	336.82	25,764
332.70	699	334.78	13,827	336.86	25,915
332.74	839	334.82	14,105	336.90	26,063
332.78	978	334.86	14,383	336.94	26,208
332.82	1,118	334.90	14,659	336.98	26,351
332.86	1,258	334.94	14,934	337.02	26,491
332.90	1,398	334.98	15,208	337.06	26,631
332.94	1,537	335.02	15,481	337.10	26,770
332.98	1,677	335.06	15,752	337.14	26,910
333.02	1,817	335.10	16,023	337.18	27,050
333.06	1,957	335.14	16,293	337.22	27,190
333.10	2,096	335.18	16,561	337.26	27,329
333.14	2,236	335.22	16,828	337.30	27,469
333.18	2,376	335.26	17,093	337.34	27,609
333.22	2,516	335.30	17,358	337.38	27,749
333.26	2,696	335.34	17,621	337.42	27,888
333.30	3,000	335.38	17,882	337.46	28,028
333.34	3,303	335.42	18,142	337.50	28,168
333.38	3,605	335.46	18,401	337.54	28,308
333.42	3,907	335.50	18,658	337.58	28,447
333.46	4,208	335.54	18,913	337.62	28,587
333.50	4,509	335.58	19,167	337.66	28,727
333.54	4,810	335.62	19,419	337.70	28,867
333.58	5,110	335.66	19,670	337.74	29,007
333.62	5,410	335.70	19,919	337.78	29,146
333.66	5,709	335.74	20,166	337.82	29,286
333.70	6,007	335.78	20,411	337.86	29,426
333.74	6,305	335.82	20,654	337.90	29,566
333.78	6,603	335.86	20,895	337.94	29,705
333.82	6,900	335.90	21,134	337.98	**29,845**
333.86	7,196	335.94	21,372		
333.90	7,492	335.98	21,607		
333.94	7,788	336.02	21,839		
333.98	8,082	336.06	22,069		
334.02	8,377	336.10	22,297		
334.06	8,670	336.14	22,523		
334.10	8,963	336.18	22,745		
334.14	9,255	336.22	22,965		
334.18	9,547	336.26	23,182		
334.22	9,838	336.30	23,396		
334.26	10,128	336.34	23,607		
334.30	10,417	336.38	23,815		
334.34	10,706	336.42	24,018		
334.38	10,994	336.46	24,218		
334.42	11,281	336.50	24,413		
334.46	11,567	336.54	24,602		
334.50	11,853	336.58	24,786		
334.54	12,138	336.62	24,963		

Summary for Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road

Inflow Area = 38.103 ac, 39.70% Impervious, Inflow Depth = 4.43" for 25-year event
Inflow = 105.73 cfs @ 12.21 hrs, Volume= 14.077 af
Primary = 105.73 cfs @ 12.21 hrs, Volume= 14.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth = 3.32" for 25-year event
Inflow = 0.78 cfs @ 12.14 hrs, Volume= 0.063 af
Primary = 0.78 cfs @ 12.14 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 3.319 ac, 31.26% Impervious, Inflow Depth = 3.80" for 25-year event
Inflow = 10.59 cfs @ 12.12 hrs, Volume= 1.051 af
Primary = 10.59 cfs @ 12.12 hrs, Volume= 1.051 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.024 ac, 0.00% Impervious, Inflow Depth = 3.93" for 25-year event
Inflow = 8.10 cfs @ 12.14 hrs, Volume= 0.664 af
Primary = 8.10 cfs @ 12.14 hrs, Volume= 0.664 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 2.001 ac, 63.27% Impervious, Inflow Depth = 5.10" for 25-year event
Inflow = 9.88 cfs @ 12.14 hrs, Volume= 0.850 af
Primary = 9.88 cfs @ 12.14 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 0.911 ac, 0.00% Impervious, Inflow Depth = 3.13" for 25-year event
Inflow = 2.66 cfs @ 12.18 hrs, Volume= 0.237 af
Primary = 2.66 cfs @ 12.18 hrs, Volume= 0.237 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.144 ac, 0.00% Impervious, Inflow Depth = 3.13" for 25-year event
Inflow = 0.45 cfs @ 12.15 hrs, Volume= 0.037 af
Primary = 0.45 cfs @ 12.15 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPWS-1: PWS-1 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=7.00"
Tc=6.0 min CN=90 Runoff=10.62 cfs 0.809 af

SubcatchmentPWS-10: PWS-10 NE corner Runoff Area=6,269 sf 0.00% Impervious Runoff Depth=4.64"
Flow Length=50' Slope=0.0270 '/' Tc=10.9 min CN=70 Runoff=0.67 cfs 0.056 af

SubcatchmentPWS-11: PWS-11 SE edge Runoff Area=15,122 sf 0.00% Impervious Runoff Depth=4.64"
Flow Length=50' Slope=0.0540 '/' Tc=8.3 min CN=70 Runoff=1.74 cfs 0.134 af

SubcatchmentPWS-12: PWS-12 E to Runoff Area=69,072 sf 8.92% Impervious Runoff Depth=5.22"
Flow Length=551' Tc=27.0 min CN=75 Runoff=5.73 cfs 0.690 af

SubcatchmentPWS-13: PWS-13 NE corner Runoff Area=39,673 sf 0.00% Impervious Runoff Depth=4.64"
Flow Length=184' Tc=12.9 min CN=70 Runoff=3.96 cfs 0.352 af

SubcatchmentPWS-14: PWS-14 N Bldg Runoff Area=110,964 sf 100.00% Impervious Runoff Depth=7.96"
Tc=6.0 min CN=98 Runoff=20.51 cfs 1.690 af

SubcatchmentPWS-15: PWS-15 S Bldg Runoff Area=39,471 sf 100.00% Impervious Runoff Depth=7.96"
Tc=6.0 min CN=98 Runoff=7.30 cfs 0.601 af

SubcatchmentPWS-16: PWS-16 "D-Series" Runoff Area=88,172 sf 0.00% Impervious Runoff Depth=5.58"
Flow Length=376' Tc=10.2 min CN=78 Runoff=11.38 cfs 0.941 af

SubcatchmentPWS-17: PWS-17 CB at top Runoff Area=13,715 sf 57.37% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=88 Runoff=2.36 cfs 0.177 af

SubcatchmentPWS-18: PWS-18 Runoff Area=87,171 sf 63.27% Impervious Runoff Depth=6.76"
Flow Length=283' Tc=10.1 min CN=88 Runoff=13.13 cfs 1.128 af

SubcatchmentPWS-19: PWS-19 S of Central Runoff Area=9,970 sf 0.00% Impervious Runoff Depth=4.87"
Flow Length=178' Tc=10.1 min CN=72 Runoff=1.14 cfs 0.093 af

SubcatchmentPWS-2: PWS-2 Parking S Runoff Area=74,942 sf 100.00% Impervious Runoff Depth=7.96"
Flow Length=134' Tc=7.3 min CN=98 Runoff=13.25 cfs 1.141 af

SubcatchmentPWS-20: PWS-20 CB at top Runoff Area=12,926 sf 65.19% Impervious Runoff Depth=7.00"
Tc=6.0 min CN=90 Runoff=2.27 cfs 0.173 af

SubcatchmentPWS-21: PWS-21 Runoff Area=7,624 sf 100.00% Impervious Runoff Depth=7.96"
Tc=6.0 min CN=98 Runoff=1.41 cfs 0.116 af

SubcatchmentPWS-22: PWS-22 Bldg to Runoff Area=20,000 sf 100.00% Impervious Runoff Depth=7.96"
Tc=6.0 min CN=98 Runoff=3.70 cfs 0.305 af

SubcatchmentPWS-23: PWS-23 Loading Runoff Area=60,360 sf 64.65% Impervious Runoff Depth=7.00"
Tc=6.0 min CN=90 Runoff=10.62 cfs 0.809 af

SubcatchmentPWS-3: PWS-3 Central Runoff Area=118,531 sf 76.18% Impervious Runoff Depth=7.24"
Tc=6.0 min CN=92 Runoff=21.22 cfs 1.642 af

SubcatchmentPWS-4: PWS-4 N Central Runoff Area=135,800 sf 51.34% Impervious Runoff Depth=6.53"
Flow Length=156' Tc=11.0 min CN=86 Runoff=19.41 cfs 1.695 af

SubcatchmentPWS-5: PWS-5 Play Fields Runoff Area=646,224 sf 15.98% Impervious Runoff Depth=5.58"
Flow Length=1,344' Tc=14.5 min CN=78 Runoff=73.80 cfs 6.894 af

SubcatchmentPWS-6: PWS-6 W Main drive Runoff Area=38,987 sf 52.87% Impervious Runoff Depth=6.64"
Flow Length=504' Tc=9.5 min CN=87 Runoff=5.91 cfs 0.496 af

SubcatchmentPWS-7: PWS-7 E Baseball Runoff Area=157,633 sf 0.95% Impervious Runoff Depth=4.99"
Flow Length=562' Tc=16.5 min CN=73 Runoff=15.44 cfs 1.504 af

SubcatchmentPWS-8: PWS-8 W Baseball Runoff Area=140,196 sf 4.41% Impervious Runoff Depth=5.10"
Flow Length=248' Tc=11.7 min CN=74 Runoff=15.94 cfs 1.369 af

SubcatchmentPWS-9: PWS-9 W Parking & Runoff Area=82,387 sf 71.65% Impervious Runoff Depth=7.12"
Flow Length=575' Tc=11.0 min CN=91 Runoff=12.45 cfs 1.123 af

Reach 1R: B4-03-DMH to B4-08-DMH Avg. Flow Depth=1.31' Max Vel=6.78 fps Inflow=11.06 cfs 2.498 af
18.0" Round Pipe n=0.013 L=239.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=11.04 cfs 2.498 af

Reach 2R: B4-08-DMH to B4-11-DMH Avg. Flow Depth=1.75' Max Vel=7.62 fps Inflow=21.84 cfs 4.240 af
21.0" Round Pipe n=0.013 L=492.0' S=0.0103 '/' Capacity=16.08 cfs Outflow=17.11 cfs 4.240 af

Reach 3R: B3-12-DMH to outfall Avg. Flow Depth=0.88' Max Vel=14.97 fps Inflow=20.05 cfs 4.591 af
24.0" Round Pipe n=0.011 L=130.0' S=0.0346 '/' Capacity=49.74 cfs Outflow=19.99 cfs 4.591 af

Reach 4R: C2-02-DMH to C2-03-DMH Avg. Flow Depth=1.25' Max Vel=7.88 fps Inflow=9.84 cfs 1.730 af
15.0" Round Pipe n=0.013 L=84.0' S=0.0173 '/' Capacity=8.49 cfs Outflow=9.01 cfs 1.730 af

Reach 5R: C2-03-DMH to C2-04-DMH Avg. Flow Depth=0.83' Max Vel=10.34 fps Inflow=9.01 cfs 1.730 af
15.0" Round Pipe n=0.013 L=190.0' S=0.0316 '/' Capacity=11.48 cfs Outflow=8.90 cfs 1.730 af

Pond 1P: Wetland Replication Peak Elev=377.47' Storage=7,176 cf Inflow=13.30 cfs 1.499 af
Outflow=12.81 cfs 1.376 af

Pond 2P: POA-1 "A-Series" Wetland Peak Elev=309.19' Storage=10,115 cf Inflow=34.71 cfs 6.095 af
Primary=20.39 cfs 5.762 af Secondary=11.91 cfs 0.333 af Outflow=32.30 cfs 6.095 af

Pond 3P: POA-2 "B-Series" Wetland Peak Elev=313.32' Storage=2,565 cf Inflow=24.81 cfs 3.099 af
Primary=23.37 cfs 3.088 af Secondary=0.00 cfs 0.000 af Outflow=23.37 cfs 3.088 af

Pond BMP-1: BMP-1 Peak Elev=375.21' Storage=32,475 cf Inflow=31.13 cfs 2.498 af
Outflow=11.06 cfs 2.498 af

Pond BMP-2: BMP-2 Peak Elev=373.90' Storage=13,682 cf Inflow=20.47 cfs 1.742 af
Outflow=13.54 cfs 1.742 af

Pond BMP-3: BMP-3 Peak Elev=359.40' Storage=31,862 cf Inflow=24.92 cfs 1.947 af
15.0" Round Culvert n=0.013 L=18.0' S=0.0100 '/' Outflow=9.84 cfs 1.730 af

Pond BMP-4: BMP-4 Peak Elev=337.08' Storage=26,690 cf Inflow=37.71 cfs 3.313 af
24.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=25.43 cfs 3.252 af

Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road Inflow=141.78 cfs 19.112 af
Primary=141.78 cfs 19.112 af

Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium Inflow=1.14 cfs 0.093 af
Primary=1.14 cfs 0.093 af

Link POA-5: POA-5 SE corner to Franklin Crossing Condominium Inflow=14.55 cfs 1.510 af
Primary=14.55 cfs 1.510 af

Link POA-6: POA-6 "D-Series" Wetland Inflow=11.38 cfs 0.941 af
Primary=11.38 cfs 0.941 af

Link POA-7: POA-7 12" D RCP to Old West Central Street Inflow=20.09 cfs 1.461 af
Primary=20.09 cfs 1.461 af

Link POA-8: POA-8 "E-Series" Wetland Inflow=3.96 cfs 0.352 af
Primary=3.96 cfs 0.352 af

Link POA-9: POA-9 Residences Inflow=0.67 cfs 0.056 af
Primary=0.67 cfs 0.056 af

Total Runoff Area = 46.730 ac Runoff Volume = 23.936 af Average Runoff Depth = 6.15"
62.70% Pervious = 29.299 ac 37.30% Impervious = 17.431 ac

Summary for Subcatchment PWS-1: PWS-1 Loading

Runoff = 10.62 cfs @ 12.08 hrs, Volume= 0.809 af, Depth= 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-10: PWS-10 NE corner (Fields)

Runoff = 0.67 cfs @ 12.15 hrs, Volume= 0.056 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
6,269	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,269	70	Weighted Average
6,269		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	50	0.0270	0.08		**Sheet Flow, SHEET 50 FT WOODS**
					Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-11: PWS-11 SE edge

Runoff = 1.74 cfs @ 12.12 hrs, Volume= 0.134 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
1,211	74	>75% Grass cover, Good, HSG C
13,911	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
15,122	70	Weighted Average
15,122		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0540	0.10		**Sheet Flow, SHEET 50 FT**
					Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PWS-12: PWS-12 E to wetland replication

Runoff = 5.73 cfs @ 12.37 hrs, Volume= 0.690 af, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
35,208	74	>75% Grass cover, Good, HSG C
27,704	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
6,160	98	Water Surface, HSG C
69,072	75	Weighted Average
62,912		91.08% Pervious Area
6,160		8.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, SHEET 50 FT WOODS**
					Woods: Light underbrush n= 0.400 P2= 3.20"
14.1	501	0.0140	0.59		**Shallow Concentrated Flow, SCF 258 FT**
					Woodland Kv= 5.0 fps
27.0	551	Total			

Summary for Subcatchment PWS-13: PWS-13 NE corner

Runoff = 3.96 cfs @ 12.18 hrs, Volume= 0.352 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
3,912	74	>75% Grass cover, Good, HSG C
35,761	70	Woods, Good, HSG C
0	87	Dirt roads, HSG C
39,673	70	Weighted Average
39,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
2.4	134	0.0360	0.95		**Shallow Concentrated Flow, SCF 134 FT WOODS** Woodland Kv= 5.0 fps
12.9	184	Total			

Summary for Subcatchment PWS-14: PWS-14 N Bldg

Runoff = 20.51 cfs @ 12.08 hrs, Volume= 1.690 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	110,964	98	Roof, HSG C
	110,964		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-15: PWS-15 S Bldg (minus 20K to recharge)

Runoff = 7.30 cfs @ 12.08 hrs, Volume= 0.601 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	39,471	98	Roof, HSG C
	39,471		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-16: PWS-16 "D-Series" Wetland Tributary

Runoff = 11.38 cfs @ 12.14 hrs, Volume= 0.941 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
82,594	77	Woods, Good, HSG D
5,578	96	Gravel surface, HSG D
88,172	78	Weighted Average
88,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0840	0.12		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	326	0.1100	1.66		**Shallow Concentrated Flow, SCF 326 FT WOODS** Woodland Kv= 5.0 fps
10.2	376	Total			

Summary for Subcatchment PWS-17: PWS-17 CB at top of paved access drive

Runoff = 2.36 cfs @ 12.08 hrs, Volume= 0.177 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
7,868	98	Paved parking, HSG C
5,847	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
13,715	88	Weighted Average
5,847		42.63% Pervious Area
7,868		57.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-18: PWS-18 Tri-County Drive Tributary

Runoff = 13.13 cfs @ 12.13 hrs, Volume= 1.128 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
51,279	98	Paved parking, HSG D
3,878	98	Paved parking, HSG A
27,700	77	Woods, Good, HSG D
4,314	30	Woods, Good, HSG A
87,171	88	Weighted Average
32,014		36.73% Pervious Area
55,157		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, SHEET 50 FT WOODS** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	128	0.1200	1.73		**Shallow Concentrated Flow, SCF 128 FT WOODS** Woodland Kv= 5.0 fps
0.9	105	0.0790	1.97		**Shallow Concentrated Flow, SCF 105 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
10.1	283	Total			

Summary for Subcatchment PWS-19: PWS-19 S of Central Parking

Runoff = 1.14 cfs @ 12.14 hrs, Volume= 0.093 af, Depth= 4.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG C
6,122	74	>75% Grass cover, Good, HSG C
3,848	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
9,970	72	Weighted Average
9,970		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow, SHEET 50 FT** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	128	0.0700	1.32		**Shallow Concentrated Flow, SCF 128 FT** Woodland Kv= 5.0 fps
10.1	178	Total			

Summary for Subcatchment PWS-2: PWS-2 Parking S of Bldg

Runoff = 13.25 cfs @ 12.10 hrs, Volume= 1.141 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
	43,283	98	Paved parking, HSG C
*	31,659	98	>75% Grass cover, Good, HSG C
	74,942	98	Weighted Average
	74,942		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0144	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	33	0.0360	1.33		**Shallow Concentrated Flow, SCF 33 FT** Short Grass Pasture Kv= 7.0 fps
0.5	51	0.0060	1.57		**Shallow Concentrated Flow, SCF 51 FT** Paved Kv= 20.3 fps
7.3	134	Total			

Summary for Subcatchment PWS-20: PWS-20 CB at top of driveway

Runoff = 2.27 cfs @ 12.08 hrs, Volume= 0.173 af, Depth= 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
8,427	98	Paved parking, HSG C
4,499	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
12,926	90	Weighted Average
4,499		34.81% Pervious Area
8,427		65.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-21: PWS-21 Tri-County Drive to CB

Runoff = 1.41 cfs @ 12.08 hrs, Volume= 0.116 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
7,624	98	Paved parking, HSG C
0	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
0	96	Gravel surface, HSG C
7,624	98	Weighted Average
7,624		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-22: PWS-22 Bldg to recharge

Runoff = 3.70 cfs @ 12.08 hrs, Volume= 0.305 af, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	20,000	98	Roof, HSG C
	20,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-23: PWS-23 Loading Area and Shed to wetland replication

Runoff = 10.62 cfs @ 12.08 hrs, Volume= 0.809 af, Depth= 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
39,025	98	Paved parking, HSG C
21,335	74	>75% Grass cover, Good, HSG C
60,360	90	Weighted Average
21,335		35.35% Pervious Area
39,025		64.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-3: PWS-3 Central Parking

Runoff = 21.22 cfs @ 12.08 hrs, Volume= 1.642 af, Depth= 7.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	90,299	98	Paved parking & bldg, HSG C
	28,232	74	>75% Grass cover, Good, HSG C
	118,531	92	Weighted Average
	28,232		23.82% Pervious Area
	90,299		76.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, DIRECT ENTRY**

Summary for Subcatchment PWS-4: PWS-4 N Central Parking

Runoff = 19.41 cfs @ 12.15 hrs, Volume= 1.695 af, Depth= 6.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	69,719	98	Paved parking & bldg, HSG C
	66,081	74	>75% Grass cover, Good, HSG C
	135,800	86	Weighted Average
	66,081		48.66% Pervious Area
	69,719		51.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.4	41	0.0480	1.53		**Shallow Concentrated Flow, SCF 41 FT** Short Grass Pasture Kv= 7.0 fps
0.3	65	0.0310	3.57		**Shallow Concentrated Flow, SCF 65 FT** Paved Kv= 20.3 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
11.0	156	Total			

Summary for Subcatchment PWS-5: PWS-5 Play Fields

Runoff = 73.80 cfs @ 12.20 hrs, Volume= 6.894 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

	Area (sf)	CN	Description
*	103,282	98	Paved parking & bldg, HSG C
	463,146	74	>75% Grass cover, Good, HSG C
	65,535	70	Woods, Good, HSG C
	14,261	87	Dirt roads, HSG C
	646,224	78	Weighted Average
	542,942		84.02% Pervious Area
	103,282		15.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0120	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
6.4	514	0.0370	1.35		**Shallow Concentrated Flow, SCF 514 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-4 PIPE SEGMENTS**
0.7	780	0.0300	19.31	136.53	**Pipe Channel, RCP_Round 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011
14.5	1,344	Total			

Summary for Subcatchment PWS-6: PWS-6 W Main drive

Runoff = 5.91 cfs @ 12.13 hrs, Volume= 0.496 af, Depth= 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
20,613	98	Paved parking, HSG C
18,374	74	>75% Grass cover, Good, HSG C
38,987	87	Weighted Average
18,374		47.13% Pervious Area
20,613		52.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
1.8	198	0.0680	1.83		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
1.2	256	0.0300	3.52		**Shallow Concentrated Flow, SCF 256 FT** Paved Kv= 20.3 fps
9.5	504	Total			

Summary for Subcatchment PWS-7: PWS-7 E Baseball & Wetland Tributary

Runoff = 15.44 cfs @ 12.23 hrs, Volume= 1.504 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
1,497	98	Paved parking, HSG C
83,000	74	>75% Grass cover, Good, HSG C
67,324	70	Woods, Good, HSG C
5,812	87	Dirt roads, HSG C
157,633	73	Weighted Average
156,136		99.05% Pervious Area
1,497		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
7.3	258	0.0070	0.59		**Shallow Concentrated Flow, SCF 258 FT** Short Grass Pasture Kv= 7.0 fps
2.4	254	0.1230	1.75		**Shallow Concentrated Flow, SCF 254 FT** Woodland Kv= 5.0 fps
0.3					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
16.5	562	Total			

Summary for Subcatchment PWS-8: PWS-8 W Baseball & Wetland Tributary

Runoff = 15.94 cfs @ 12.16 hrs, Volume= 1.369 af, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
6,188	98	Paved parking, HSG C
60,836	74	>75% Grass cover, Good, HSG C
67,878	70	Woods, Good, HSG C
5,294	87	Dirt roads, HSG C
140,196	74	Weighted Average
134,008		95.59% Pervious Area
6,188		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0140	0.13		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
4.7	198	0.0100	0.70		**Shallow Concentrated Flow, SCF 198 FT** Short Grass Pasture Kv= 7.0 fps
0.5					**Direct Entry, DIRECT-2 PIPE SEGMENTS**
11.7	248	Total			

Summary for Subcatchment PWS-9: PWS-9 W Parking & SW football field

Runoff = 12.45 cfs @ 12.14 hrs, Volume= 1.123 af, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.20"

Area (sf)	CN	Description
59,027	98	Paved parking, HSG C
23,360	74	>75% Grass cover, Good, HSG C
82,387	91	Weighted Average
23,360		28.35% Pervious Area
59,027		71.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0110	0.12		**Sheet Flow, SHEET 50 FT** Grass: Short n= 0.150 P2= 3.20"
0.9	120	0.1090	2.31		**Shallow Concentrated Flow, SCF 120 FT** Short Grass Pasture Kv= 7.0 fps
3.0	405	0.0120	2.22		**Shallow Concentrated Flow, SCF 405 FT** Paved Kv= 20.3 fps
11.0	575	Total			

Summary for Reach 1R: B4-03-DMH to B4-08-DMH

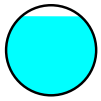
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 105% of Manning's capacity
[79] Warning: Submerged Pond BMP-1 Primary device # 1 OUTLET by 1.21'

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 7.62" for 100-year event
Inflow = 11.06 cfs @ 12.34 hrs, Volume= 2.498 af
Outflow = 11.04 cfs @ 12.36 hrs, Volume= 2.498 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.78 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 2.5 min

Peak Storage= 392 cf @ 12.35 hrs
Average Depth at Peak Storage= 1.31'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 239.0' Slope= 0.0100 '/'
Inlet Invert= 369.10', Outlet Invert= 366.71'



Stage-Area-Storage for Reach 1R: B4-03-DMH to B4-08-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
369.10	0.0	0	370.14	1.3	312
369.12	0.0	1	370.16	1.3	319
369.14	0.0	3	370.18	1.4	326
369.16	0.0	6	370.20	1.4	332
369.18	0.0	9	370.22	1.4	338
369.20	0.1	12	370.24	1.4	344
369.22	0.1	16	370.26	1.5	350
369.24	0.1	20	370.28	1.5	356
369.26	0.1	24	370.30	1.5	362
369.28	0.1	29	370.32	1.5	368
369.30	0.1	33	370.34	1.6	373
369.32	0.2	38	370.36	1.6	379
369.34	0.2	44	370.38	1.6	384
369.36	0.2	49	370.40	1.6	389
369.38	0.2	54	370.42	1.6	394
369.40	0.3	60	370.44	1.7	398
369.42	0.3	66	370.46	1.7	402
369.44	0.3	72	370.48	1.7	407
369.46	0.3	78	370.50	1.7	410
369.48	0.4	84	370.52	1.7	414
369.50	0.4	90	370.54	1.7	417
369.52	0.4	97	370.56	1.8	419
369.54	0.4	103	370.58	1.8	421
369.56	0.5	110	370.60	**1.8**	**422**
369.58	0.5	117			
369.60	0.5	123			
369.62	0.5	130			
369.64	0.6	137			
369.66	0.6	144			
369.68	0.6	151			
369.70	0.7	158			
369.72	0.7	165			
369.74	0.7	172			
369.76	0.7	179			
369.78	0.8	186			
369.80	0.8	193			
369.82	0.8	200			
369.84	0.9	208			
369.86	0.9	215			
369.88	0.9	222			
369.90	1.0	229			
369.92	1.0	236			
369.94	1.0	243			
369.96	1.0	250			
369.98	1.1	258			
370.00	1.1	265			
370.02	1.1	272			
370.04	1.2	279			
370.06	1.2	285			
370.08	1.2	292			
370.10	1.3	299			
370.12	1.3	306			

Summary for Reach 2R: B4-08-DMH to B4-11-DMH

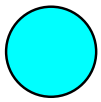
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 136% of Manning's capacity
[76] Warning: Detained 0.109 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.12' @ 12.90 hrs
[79] Warning: Submerged Pond BMP-2 Primary device # 1 OUTLET by 1.42'

Inflow Area = 6.560 ac, 92.53% Impervious, Inflow Depth = 7.76" for 100-year event
Inflow = 21.84 cfs @ 12.25 hrs, Volume= 4.240 af
Outflow = 17.11 cfs @ 12.18 hrs, Volume= 4.240 af, Atten= 22%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.62 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 4.5 min

Peak Storage= 1,183 cf @ 12.17 hrs
Average Depth at Peak Storage= 1.75'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 16.08 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 492.0' Slope= 0.0103 '/'
Inlet Invert= 365.92', Outlet Invert= 360.85'



Stage-Area-Storage for Reach 2R: B4-08-DMH to B4-11-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
365.92	0.0	0	366.96	1.5	733
365.94	0.0	3	366.98	1.5	750
365.96	0.0	7	367.00	1.6	767
365.98	0.0	13	367.02	1.6	783
366.00	0.0	19	367.04	1.6	800
366.02	0.1	27	367.06	1.7	816
366.04	0.1	35	367.08	1.7	833
366.06	0.1	44	367.10	1.7	849
366.08	0.1	54	367.12	1.8	865
366.10	0.1	64	367.14	1.8	881
366.12	0.2	75	367.16	1.8	897
366.14	0.2	86	367.18	1.9	912
366.16	0.2	98	367.20	1.9	928
366.18	0.2	110	367.22	1.9	943
366.20	0.2	122	367.24	1.9	958
366.22	0.3	135	367.26	2.0	972
366.24	0.3	148	367.28	2.0	987
366.26	0.3	162	367.30	2.0	1,001
366.28	0.4	175	367.32	2.1	1,015
366.30	0.4	189	367.34	2.1	1,029
366.32	0.4	204	367.36	2.1	1,042
366.34	0.4	218	367.38	2.1	1,055
366.36	0.5	233	367.40	2.2	1,067
366.38	0.5	248	367.42	2.2	1,080
366.40	0.5	264	367.44	2.2	1,092
366.42	0.6	279	367.46	2.2	1,103
366.44	0.6	295	367.48	2.3	1,114
366.46	0.6	310	367.50	2.3	1,124
366.48	0.7	326	367.52	2.3	1,134
366.50	0.7	343	367.54	2.3	1,144
366.52	0.7	359	367.56	2.3	1,152
366.54	0.8	375	367.58	2.4	1,160
366.56	0.8	392	367.60	2.4	1,168
366.58	0.8	408	367.62	2.4	1,174
366.60	0.9	425	367.64	2.4	1,179
366.62	0.9	442	367.66	**2.4**	**1,182**
366.64	0.9	459			
366.66	1.0	476			
366.68	1.0	493			
366.70	1.0	510			
366.72	1.1	527			
366.74	1.1	544			
366.76	1.1	562			
366.78	1.2	579			
366.80	1.2	596			
366.82	1.2	613			
366.84	1.3	630			
366.86	1.3	648			
366.88	1.4	665			
366.90	1.4	682			
366.92	1.4	699			
366.94	1.5	716			

Summary for Reach 3R: B3-12-DMH to outfall

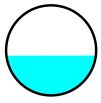
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 7.171 ac, 89.86% Impervious, Inflow Depth = 7.68" for 100-year event
Inflow = 20.05 cfs @ 12.17 hrs, Volume= 4.591 af
Outflow = 19.99 cfs @ 12.18 hrs, Volume= 4.591 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 14.97 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.34 fps, Avg. Travel Time= 0.6 min

Peak Storage= 174 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.88'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 49.74 cfs

24.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 130.0' Slope= 0.0346 '/'
Inlet Invert= 352.30', Outlet Invert= 347.80'



Stage-Area-Storage for Reach 3R: B3-12-DMH to outfall

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
352.30	0.0	0	353.34	1.7	215
352.32	0.0	1	353.36	1.7	220
352.34	0.0	2	353.38	1.7	225
352.36	0.0	4	353.40	1.8	230
352.38	0.0	5	353.42	1.8	235
352.40	0.1	8	353.44	1.8	240
352.42	0.1	10	353.46	1.9	246
352.44	0.1	13	353.48	1.9	251
352.46	0.1	15	353.50	2.0	256
352.48	0.1	18	353.52	2.0	261
352.50	0.2	21	353.54	2.0	266
352.52	0.2	24	353.56	2.1	271
352.54	0.2	28	353.58	2.1	276
352.56	0.2	31	353.60	2.2	281
352.58	0.3	35	353.62	2.2	286
352.60	0.3	38	353.64	2.2	291
352.62	0.3	42	353.66	2.3	296
352.64	0.4	46	353.68	2.3	301
352.66	0.4	50	353.70	2.3	305
352.68	0.4	54	353.72	2.4	310
352.70	0.4	58	353.74	2.4	315
352.72	0.5	62	353.76	2.5	319
352.74	0.5	67	353.78	2.5	324
352.76	0.5	71	353.80	2.5	329
352.78	0.6	75	353.82	2.6	333
352.80	0.6	80	353.84	2.6	337
352.82	0.6	84	353.86	2.6	342
352.84	0.7	89	353.88	2.7	346
352.86	0.7	94	353.90	2.7	350
352.88	0.8	98	353.92	2.7	354
352.90	0.8	103	353.94	2.8	358
352.92	0.8	108	353.96	2.8	362
352.94	0.9	113	353.98	2.8	366
352.96	0.9	118	354.00	2.8	370
352.98	0.9	122	354.02	2.9	374
353.00	1.0	127	354.04	2.9	377
353.02	1.0	132	354.06	2.9	381
353.04	1.1	137	354.08	3.0	384
353.06	1.1	142	354.10	3.0	387
353.08	1.1	147	354.12	3.0	390
353.10	1.2	153	354.14	3.0	393
353.12	1.2	158	354.16	3.0	396
353.14	1.3	163	354.18	3.1	398
353.16	1.3	168	354.20	3.1	401
353.18	1.3	173	354.22	3.1	403
353.20	1.4	178	354.24	3.1	405
353.22	1.4	183	354.26	3.1	406
353.24	1.5	189	354.28	3.1	408
353.26	1.5	194	354.30	**3.1**	**408**
353.28	1.5	199			
353.30	1.6	204			
353.32	1.6	209			

Summary for Reach 4R: C2-02-DMH to C2-03-DMH

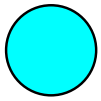
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 116% of Manning's capacity
[76] Warning: Detained 0.034 af (Pond w/culvert advised)
[79] Warning: Submerged Pond BMP-3 Primary device # 1 INLET by 0.95'

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 6.53" for 100-year event
Inflow = 9.84 cfs @ 12.30 hrs, Volume= 1.730 af
Outflow = 9.01 cfs @ 12.16 hrs, Volume= 1.730 af, Atten= 8%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.88 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 0.8 min

Peak Storage= 103 cf @ 12.17 hrs
Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.49 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 84.0' Slope= 0.0173 '/'
Inlet Invert= 355.70', Outlet Invert= 354.25'



Stage-Area-Storage for Reach 4R: C2-02-DMH to C2-03-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
355.70	0.0	0	356.74	1.1	92
355.72	0.0	0	356.76	1.1	93
355.74	0.0	1	356.78	1.1	95
355.76	0.0	2	356.80	1.1	96
355.78	0.0	3	356.82	1.2	97
355.80	0.0	4	356.84	1.2	99
355.82	0.1	5	356.86	1.2	100
355.84	0.1	6	356.88	1.2	101
355.86	0.1	8	356.90	1.2	102
355.88	0.1	9	356.92	1.2	102
355.90	0.1	11	356.94	**1.2**	**103**
355.92	0.1	12			
355.94	0.2	14			
355.96	0.2	16			
355.98	0.2	17			
356.00	0.2	19			
356.02	0.2	21			
356.04	0.3	23			
356.06	0.3	25			
356.08	0.3	26			
356.10	0.3	28			
356.12	0.4	30			
356.14	0.4	32			
356.16	0.4	34			
356.18	0.4	36			
356.20	0.5	39			
356.22	0.5	41			
356.24	0.5	43			
356.26	0.5	45			
356.28	0.6	47			
356.30	0.6	49			
356.32	0.6	51			
356.34	0.6	53			
356.36	0.7	55			
356.38	0.7	57			
356.40	0.7	59			
356.42	0.7	61			
356.44	0.8	64			
356.46	0.8	66			
356.48	0.8	68			
356.50	0.8	70			
356.52	0.9	72			
356.54	0.9	74			
356.56	0.9	76			
356.58	0.9	78			
356.60	0.9	79			
356.62	1.0	81			
356.64	1.0	83			
356.66	1.0	85			
356.68	1.0	87			
356.70	1.1	88			
356.72	1.1	90			

Summary for Reach 5R: C2-03-DMH to C2-04-DMH

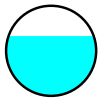
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 4R outlet invert by 0.58' @ 12.16 hrs

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 6.53" for 100-year event
Inflow = 9.01 cfs @ 12.16 hrs, Volume= 1.730 af
Outflow = 8.90 cfs @ 12.17 hrs, Volume= 1.730 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.34 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 1.5 min

Peak Storage= 164 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 11.48 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 190.0' Slope= 0.0316 '/'
Inlet Invert= 354.00', Outlet Invert= 348.00'



Stage-Area-Storage for Reach 5R: C2-03-DMH to C2-04-DMH

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
354.00	0.0	0	355.04	1.1	207
354.02	0.0	1	355.06	1.1	211
354.04	0.0	2	355.08	1.1	214
354.06	0.0	4	355.10	1.1	217
354.08	0.0	6	355.12	1.2	220
354.10	0.0	9	355.14	1.2	223
354.12	0.1	11	355.16	1.2	226
354.14	0.1	14	355.18	1.2	228
354.16	0.1	17	355.20	1.2	230
354.18	0.1	21	355.22	1.2	232
354.20	0.1	24	355.24	**1.2**	**233**
354.22	0.1	28			
354.24	0.2	31			
354.26	0.2	35			
354.28	0.2	39			
354.30	0.2	43			
354.32	0.2	47			
354.34	0.3	51			
354.36	0.3	56			
354.38	0.3	60			
354.40	0.3	64			
354.42	0.4	69			
354.44	0.4	73			
354.46	0.4	78			
354.48	0.4	82			
354.50	0.5	87			
354.52	0.5	92			
354.54	0.5	96			
354.56	0.5	101			
354.58	0.6	106			
354.60	0.6	111			
354.62	0.6	115			
354.64	0.6	120			
354.66	0.7	125			
354.68	0.7	130			
354.70	0.7	134			
354.72	0.7	139			
354.74	0.8	144			
354.76	0.8	148			
354.78	0.8	153			
354.80	0.8	158			
354.82	0.9	162			
354.84	0.9	167			
354.86	0.9	171			
354.88	0.9	175			
354.90	0.9	180			
354.92	1.0	184			
354.94	1.0	188			
354.96	1.0	192			
354.98	1.0	196			
355.00	1.1	200			
355.02	1.1	204			

Summary for Pond 1P: Wetland Replication

Inflow Area = 2.971 ac, 34.91% Impervious, Inflow Depth = 6.05" for 100-year event
Inflow = 13.30 cfs @ 12.09 hrs, Volume= 1.499 af
Outflow = 12.81 cfs @ 12.12 hrs, Volume= 1.376 af, Atten= 4%, Lag= 1.7 min
Primary = 12.81 cfs @ 12.12 hrs, Volume= 1.376 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 377.47' @ 12.12 hrs Surf.Area= 8,797 sf Storage= 7,176 cf

Plug-Flow detention time= 71.5 min calculated for 1.376 af (92% of inflow)
Center-of-Mass det. time= 29.3 min (831.0 - 801.6)

Volume	Invert	Avail.Storage	Storage Description
#1	376.50'	7,475 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
376.50	6,160	400.0	0	0	6,160
377.00	7,440	495.0	3,395	3,395	12,930
377.50	8,900	515.0	4,080	7,475	14,557

Device	Routing	Invert	Outlet Devices
#1	Primary	377.25'	**50.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=12.80 cfs @ 12.12 hrs HW=377.47' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 12.80 cfs @ 1.18 fps)

Stage-Area-Storage for Pond 1P: Wetland Replication

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
376.50	6,160	0	377.02	7,496	3,544
376.51	6,184	62	377.03	7,524	3,619
376.52	6,209	124	377.04	7,552	3,695
376.53	6,233	186	377.05	7,580	3,770
376.54	6,258	248	377.06	7,608	3,846
376.55	6,283	311	377.07	7,637	3,923
376.56	6,307	374	377.08	7,665	3,999
376.57	6,332	437	377.09	7,693	4,076
376.58	6,357	501	377.10	7,722	4,153
376.59	6,381	564	377.11	7,750	4,230
376.60	6,406	628	377.12	7,778	4,308
376.61	6,431	692	377.13	7,807	4,386
376.62	6,456	757	377.14	7,836	4,464
376.63	6,481	822	377.15	7,864	4,543
376.64	6,506	887	377.16	7,893	4,621
376.65	6,531	952	377.17	7,922	4,701
376.66	6,556	1,017	377.18	7,951	4,780
376.67	6,582	1,083	377.19	7,979	4,860
376.68	6,607	1,149	377.20	8,008	4,939
376.69	6,632	1,215	377.21	8,037	5,020
376.70	6,658	1,281	377.22	8,066	5,100
376.71	6,683	1,348	377.23	8,095	5,181
376.72	6,708	1,415	377.24	8,124	5,262
376.73	6,734	1,482	377.25	8,154	5,343
376.74	6,759	1,550	377.26	8,183	5,425
376.75	6,785	1,617	377.27	8,212	5,507
376.76	6,811	1,685	377.28	8,241	5,589
376.77	6,836	1,754	377.29	8,271	5,672
376.78	6,862	1,822	377.30	8,300	5,755
376.79	6,888	1,891	377.31	8,330	5,838
376.80	6,914	1,960	377.32	8,359	5,921
376.81	6,939	2,029	377.33	8,389	6,005
376.82	6,965	2,099	377.34	8,419	6,089
376.83	6,991	2,169	377.35	8,448	6,174
376.84	7,017	2,239	377.36	8,478	6,258
376.85	7,043	2,309	377.37	8,508	6,343
376.86	7,069	2,379	377.38	8,538	6,428
376.87	7,096	2,450	377.39	8,568	6,514
376.88	7,122	2,521	377.40	8,598	6,600
376.89	7,148	2,593	377.41	8,628	6,686
376.90	7,174	2,664	377.42	8,658	6,772
376.91	7,201	2,736	377.43	8,688	6,859
376.92	7,227	2,808	377.44	8,718	6,946
376.93	7,254	2,881	377.45	8,748	7,033
376.94	7,280	2,953	377.46	8,778	7,121
376.95	7,307	3,026	377.47	8,809	7,209
376.96	7,333	3,100	377.48	8,839	7,297
376.97	7,360	3,173	377.49	8,870	7,386
376.98	7,386	3,247	377.50	**8,900**	**7,475**
376.99	7,413	3,321			
377.00	7,440	3,395			
377.01	7,468	3,470			

Summary for Pond 2P: POA-1 "A-Series" Wetland

Inflow Area = 10.790 ac, 60.04% Impervious, Inflow Depth = 6.78" for 100-year event
Inflow = 34.71 cfs @ 12.18 hrs, Volume= 6.095 af
Outflow = 32.30 cfs @ 12.29 hrs, Volume= 6.095 af, Atten= 7%, Lag= 6.6 min
Primary = 20.39 cfs @ 12.29 hrs, Volume= 5.762 af
Secondary = 11.91 cfs @ 12.29 hrs, Volume= 0.333 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 309.19' @ 12.29 hrs Surf.Area= 3,990 sf Storage= 10,115 cf

Plug-Flow detention time= 2.6 min calculated for 6.094 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (814.0 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	302.70'	13,676 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
302.70	50	20.0	0	0	50
303.00	100	40.0	22	22	146
304.00	264	83.8	175	198	582
305.00	943	141.3	569	766	1,618
306.00	1,580	180.9	1,248	2,014	2,646
307.00	1,995	207.4	1,783	3,798	3,488
308.00	2,659	241.5	2,319	6,117	4,726
308.60	3,393	262.7	1,811	7,928	5,590
309.00	3,799	283.0	1,438	9,365	6,478
310.00	4,844	298.0	4,311	13,676	7,230

Device	Routing	Invert	Outlet Devices
#1	Primary	302.70'	**18.0" Round Culvert** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 302.70' / 298.60' S= 0.0461 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Secondary	308.60'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=20.39 cfs @ 12.29 hrs HW=309.19' (Free Discharge)
↑**1=Culvert** (Inlet Controls 20.39 cfs @ 11.54 fps)

Secondary OutFlow Max=11.90 cfs @ 12.29 hrs HW=309.19' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 11.90 cfs @ 2.01 fps)

Stage-Area-Storage for Pond 2P: POA-1 "A-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
302.70	50	0	307.90	2,588	5,854
302.80	65	6	308.00	2,659	6,117
302.90	81	13	308.10	2,775	6,388
303.00	100	22	308.20	2,894	6,672
303.10	113	33	308.30	3,015	6,967
303.20	127	45	308.40	3,138	7,275
303.30	141	58	308.50	3,264	7,595
303.40	156	73	308.60	3,393	7,928
303.50	172	89	308.70	3,492	8,272
303.60	189	107	308.80	3,593	8,626
303.70	207	127	308.90	3,695	8,991
303.80	225	149	309.00	3,799	9,365
303.90	244	172	309.10	3,898	9,750
304.00	264	198	309.20	3,998	10,145
304.10	313	226	309.30	4,099	10,550
304.20	366	260	309.40	4,202	10,965
304.30	424	300	309.50	4,306	11,390
304.40	485	345	309.60	4,411	11,826
304.50	551	397	309.70	4,517	12,272
304.60	621	456	309.80	4,625	12,730
304.70	695	521	309.90	4,734	13,197
304.80	774	595	310.00	**4,844**	**13,676**
304.90	856	676			
305.00	943	766			
305.10	999	863			
305.20	1,057	966			
305.30	1,117	1,075			
305.40	1,178	1,190			
305.50	1,241	1,311			
305.60	1,306	1,438			
305.70	1,372	1,572			
305.80	1,440	1,712			
305.90	1,509	1,860			
306.00	1,580	2,014			
306.10	1,619	2,174			
306.20	1,659	2,338			
306.30	1,699	2,506			
306.40	1,740	2,678			
306.50	1,781	2,854			
306.60	1,823	3,034			
306.70	1,865	3,219			
306.80	1,908	3,407			
306.90	1,951	3,600			
307.00	1,995	3,798			
307.10	2,057	4,000			
307.20	2,120	4,209			
307.30	2,184	4,424			
307.40	2,249	4,646			
307.50	2,315	4,874			
307.60	2,382	5,109			
307.70	2,450	5,351			
307.80	2,519	5,599			

Summary for Pond 3P: POA-2 "B-Series" Wetland

Inflow Area = 6.399 ac, 41.79% Impervious, Inflow Depth = 5.81" for 100-year event
Inflow = 24.81 cfs @ 12.16 hrs, Volume= 3.099 af
Outflow = 23.37 cfs @ 12.21 hrs, Volume= 3.088 af, Atten= 6%, Lag= 2.6 min
Primary = 23.37 cfs @ 12.21 hrs, Volume= 3.088 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 313.32' @ 12.21 hrs Surf.Area= 2,700 sf Storage= 2,565 cf

Plug-Flow detention time= 8.1 min calculated for 3.087 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (849.8 - 847.3)

Volume	Invert	Avail.Storage	Storage Description
#1	306.60'	31,865 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
306.60	15	25.0	0	0	15
312.00	326	138.4	740	740	1,554
313.00	2,052	271.2	1,065	1,805	5,888
314.00	4,362	404.5	3,135	4,940	13,063
315.00	7,146	573.8	5,697	10,637	26,252
316.00	10,578	637.0	8,806	19,443	32,372
317.00	14,361	757.0	12,421	31,865	45,702

Device	Routing	Invert	Outlet Devices
#1	Primary	311.10'	**30.0" Round Culvert** L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 311.10' / 303.80' S= 0.0537 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Secondary	315.00'	**15.0' long x 24.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=23.38 cfs @ 12.21 hrs HW=313.32' (Free Discharge)
↑**1=Culvert** (Inlet Controls 23.38 cfs @ 5.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=306.60' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: POA-2 "B-Series" Wetland

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
306.60	15	0	314.40	5,394	6,888
306.75	18	2	314.55	5,809	7,728
306.90	22	5	314.70	6,239	8,631
307.05	26	9	314.85	6,685	9,600
307.20	30	13	315.00	7,146	10,637
307.35	34	18	315.15	7,618	11,744
307.50	39	23	315.30	8,105	12,923
307.65	44	30	315.45	8,607	14,177
307.80	49	37	315.60	9,125	15,506
307.95	55	44	315.75	9,657	16,915
308.10	61	53	315.90	10,205	18,404
308.25	67	63	316.05	10,753	19,977
308.40	74	73	316.20	11,288	21,630
308.55	81	85	316.35	11,836	23,364
308.70	88	98	316.50	12,397	25,181
308.85	96	111	316.65	12,971	27,084
309.00	104	126	316.80	13,558	29,073
309.15	112	143	316.95	**14,158**	**31,152**
309.30	120	160			
309.45	129	179			
309.60	138	199			
309.75	148	220			
309.90	157	243			
310.05	167	267			
310.20	178	293			
310.35	188	321			
310.50	199	350			
310.65	211	380			
310.80	222	413			
310.95	234	447			
311.10	246	483			
311.25	259	521			
311.40	272	561			
311.55	285	602			
311.70	298	646			
311.85	312	692			
312.00	326	740			
312.15	490	800			
312.30	688	888			
312.45	919	1,009			
312.60	1,183	1,166			
312.75	1,481	1,365			
312.90	1,813	1,612			
313.05	2,147	1,910			
313.20	2,445	2,254			
313.35	2,763	2,644			
313.50	3,099	3,084			
313.65	3,456	3,575			
313.80	3,831	4,121			
313.95	4,226	4,726			
314.10	4,610	5,389			
314.25	4,994	6,109			

Summary for Pond BMP-1: BMP-1

Inflow Area = 3.933 ac, 87.55% Impervious, Inflow Depth = 7.62" for 100-year event
Inflow = 31.13 cfs @ 12.08 hrs, Volume= 2.498 af
Outflow = 11.06 cfs @ 12.34 hrs, Volume= 2.498 af, Atten= 64%, Lag= 15.3 min
Primary = 11.06 cfs @ 12.34 hrs, Volume= 2.498 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 375.21' @ 12.34 hrs Surf.Area= 9,552 sf Storage= 32,475 cf

Plug-Flow detention time= 72.2 min calculated for 2.498 af (100% of inflow)
Center-of-Mass det. time= 72.5 min (824.5 - 752.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	371.25'	0 cf	**48.27'W x 197.88'L x 4.67'H Field A** 44,574 cf Overall - 44,574 cf Embedded = 0 cf x 40.0% Voids
#2A	371.25'	32,781 cf	**StormTrap ST1 SingleTrap 4-0** x 98 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 98 Chambers in 7 Rows 48.27' x 196.88' Core + 0.00' x 0.50' Border = 48.27' x 197.88' System
		32,781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	371.25'	**18.0" Round Culvert** L= 157.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 371.25' / 369.20' S= 0.0131 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	371.25'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	374.75'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=11.06 cfs @ 12.34 hrs HW=375.21' (Free Discharge)
↑**1=Culvert** (Passes 11.06 cfs of 14.41 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 7.04 cfs @ 8.96 fps)
↑**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.02 cfs @ 2.22 fps)

Pond BMP-1: BMP-1 - Chamber Wizard Field A

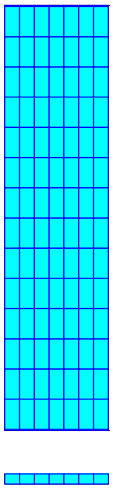
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

14 Chambers/Row x 14.06' Long = 196.88' Row Length +6.0" Border x 2 = 197.88' Base Length
7 Rows x 82.7" Wide = 48.27' Base Width
56.0" Chamber Height = 4.67' Field Height

98 Chambers x 334.5 cf = 32,781.1 cf Chamber Storage
98 Chambers x 452.5 cf + 225.3 cf Border = 44,574.1 cf Displacement

Chamber Storage = 32,781.1 cf = 0.753 af
Overall Storage Efficiency = 73.5%
Overall System Size = 197.88' x 48.27' x 4.67'

98 Chambers (plus border)
1,650.9 cy Field



Stage-Area-Storage for Pond BMP-1: BMP-1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
371.25	0	373.85	21,308
371.30	410	373.90	21,718
371.35	820	373.95	22,127
371.40	1,229	374.00	22,537
371.45	1,639	374.05	22,947
371.50	2,049	374.10	23,357
371.55	2,459	374.15	23,766
371.60	2,868	374.20	24,176
371.65	3,278	374.25	24,586
371.70	3,688	374.30	24,996
371.75	4,098	374.35	25,405
371.80	4,507	374.40	25,815
371.85	4,917	374.45	26,225
371.90	5,327	374.50	26,635
371.95	5,737	374.55	27,044
372.00	6,146	374.60	27,454
372.05	6,556	374.65	27,864
372.10	6,966	374.70	28,274
372.15	7,376	374.75	28,683
372.20	7,786	374.80	29,093
372.25	8,195	374.85	29,503
372.30	8,605	374.90	29,913
372.35	9,015	374.95	30,323
372.40	9,425	375.00	30,732
372.45	9,834	375.05	31,142
372.50	10,244	375.10	31,552
372.55	10,654	375.15	31,962
372.60	11,064	375.20	32,371
372.65	11,473	375.25	32,781
372.70	11,883	375.30	32,781
372.75	12,293	375.35	32,781
372.80	12,703	375.40	32,781
372.85	13,112	375.45	32,781
372.90	13,522	375.50	32,781
372.95	13,932	375.55	32,781
373.00	14,342	375.60	32,781
373.05	14,752	375.65	32,781
373.10	15,161	375.70	32,781
373.15	15,571	375.75	32,781
373.20	15,981	375.80	32,781
373.25	16,391	375.85	32,781
373.30	16,800	375.90	**32,781**
373.35	17,210		
373.40	17,620		
373.45	18,030		
373.50	18,439		
373.55	18,849		
373.60	19,259		
373.65	19,669		
373.70	20,078		
373.75	20,488		
373.80	20,898		

Summary for Pond BMP-2: BMP-2

Inflow Area = 2.627 ac,100.00% Impervious, Inflow Depth = 7.96" for 100-year event
Inflow = 20.47 cfs @ 12.09 hrs, Volume= 1.742 af
Outflow = 13.54 cfs @ 12.19 hrs, Volume= 1.742 af, Atten= 34%, Lag= 5.7 min
Primary = 13.54 cfs @ 12.19 hrs, Volume= 1.742 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 373.90' @ 12.19 hrs Surf.Area= 4,114 sf Storage= 13,682 cf

Plug-Flow detention time= 32.2 min calculated for 1.742 af (100% of inflow)
Center-of-Mass det. time= 32.4 min (774.1 - 741.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	370.00'	0 cf	**41.38'W x 99.44'L x 4.67'H Field A** 19,200 cf Overall - 19,200 cf Embedded = 0 cf x 40.0% Voids
#2A	370.00'	14,049 cf	**StormTrap ST1 SingleTrap 4-0** x 42 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 42 Chambers in 6 Rows 41.38' x 98.44' Core + 0.00' x 0.50' Border = 41.38' x 99.44' System
		14,049 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	370.00'	**21.0" Round Culvert** L= 71.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 370.00' / 366.25' S= 0.0528 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	370.00'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	373.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=13.53 cfs @ 12.19 hrs HW=373.90' (Free Discharge)
└**1=Culvert** (Passes 13.53 cfs of 20.13 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 6.97 cfs @ 8.87 fps)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 6.56 cfs @ 2.63 fps)

Pond BMP-2: BMP-2 - Chamber Wizard Field A

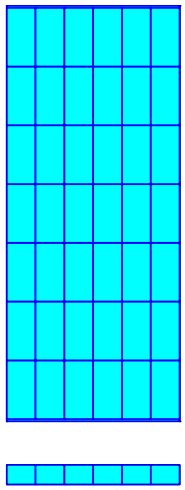
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

7 Chambers/Row x 14.06' Long = 98.44' Row Length +6.0" Border x 2 = 99.44' Base Length
6 Rows x 82.7" Wide = 41.38' Base Width
56.0" Chamber Height = 4.67' Field Height

42 Chambers x 334.5 cf = 14,049.1 cf Chamber Storage
42 Chambers x 452.5 cf + 193.1 cf Border = 19,199.7 cf Displacement

Chamber Storage = 14,049.1 cf = 0.323 af
Overall Storage Efficiency = 73.2%
Overall System Size = 99.44' x 41.38' x 4.67'

42 Chambers (plus border)
711.1 cy Field



Stage-Area-Storage for Pond BMP-2: BMP-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
370.00	0	372.60	9,132
370.05	176	372.65	9,308
370.10	351	372.70	9,483
370.15	527	372.75	9,659
370.20	702	372.80	9,834
370.25	878	372.85	10,010
370.30	1,054	372.90	10,186
370.35	1,229	372.95	10,361
370.40	1,405	373.00	10,537
370.45	1,581	373.05	10,712
370.50	1,756	373.10	10,888
370.55	1,932	373.15	11,064
370.60	2,107	373.20	11,239
370.65	2,283	373.25	11,415
370.70	2,459	373.30	11,590
370.75	2,634	373.35	11,766
370.80	2,810	373.40	11,942
370.85	2,985	373.45	12,117
370.90	3,161	373.50	12,293
370.95	3,337	373.55	12,469
371.00	3,512	373.60	12,644
371.05	3,688	373.65	12,820
371.10	3,863	373.70	12,995
371.15	4,039	373.75	13,171
371.20	4,215	373.80	13,347
371.25	4,390	373.85	13,522
371.30	4,566	373.90	13,698
371.35	4,742	373.95	13,873
371.40	4,917	374.00	14,049
371.45	5,093	374.05	14,049
371.50	5,268	374.10	14,049
371.55	5,444	374.15	14,049
371.60	5,620	374.20	14,049
371.65	5,795	374.25	14,049
371.70	5,971	374.30	14,049
371.75	6,146	374.35	14,049
371.80	6,322	374.40	14,049
371.85	6,498	374.45	14,049
371.90	6,673	374.50	14,049
371.95	6,849	374.55	14,049
372.00	7,025	374.60	14,049
372.05	7,200	374.65	**14,049**
372.10	7,376		
372.15	7,551		
372.20	7,727		
372.25	7,903		
372.30	8,078		
372.35	8,254		
372.40	8,429		
372.45	8,605		
372.50	8,781		
372.55	8,956		

Summary for Pond BMP-3: BMP-3

Inflow Area = 3.180 ac, 79.62% Impervious, Inflow Depth = 7.35" for 100-year event
Inflow = 24.92 cfs @ 12.08 hrs, Volume= 1.947 af
Outflow = 9.84 cfs @ 12.30 hrs, Volume= 1.730 af, Atten= 61%, Lag= 13.1 min
Primary = 9.84 cfs @ 12.30 hrs, Volume= 1.730 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 359.40' @ 12.30 hrs Surf.Area= 9,995 sf Storage= 31,862 cf

Plug-Flow detention time= 155.3 min calculated for 1.729 af (89% of inflow)
Center-of-Mass det. time= 102.5 min (866.7 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	354.50'	13,801 cf	**58.58'W x 170.61'L x 5.50'H Field A** 54,972 cf Overall - 20,470 cf Embedded = 34,502 cf x 40.0% Voids
#2A	355.25'	20,470 cf	**ADS_StormTech MC-3500 d +Cap**x 184 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 184 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		34,271 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	356.00'	**15.0" Round Culvert** L= 18.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 356.00' / 355.82' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=9.84 cfs @ 12.30 hrs HW=359.40' (Free Discharge)
↑**1=Culvert** (Inlet Controls 9.84 cfs @ 8.02 fps)

Pond BMP-3: BMP-3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

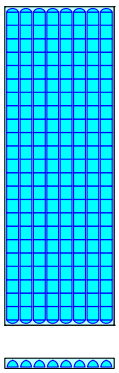
23 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 168.61' Row Length +12.0" End Stone x 2 = 170.61' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

184 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 20,469.6 cf Chamber Storage

54,972.0 cf Field - 20,469.6 cf Chambers = 34,502.4 cf Stone x 40.0% Voids = 13,801.0 cf Stone Storage

Chamber Storage + Stone Storage = 34,270.5 cf = 0.787 af
Overall Storage Efficiency = 62.3%
Overall System Size = 170.61' x 58.58' x 5.50'

184 Chambers
2,036.0 cy Field
1,277.9 cy Stone



Stage-Area-Storage for Pond BMP-3: BMP-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
354.50	0	356.58	14,233	358.66	28,798
354.54	160	356.62	14,557	358.70	28,985
354.58	320	356.66	14,881	358.74	29,168
354.62	480	356.70	15,203	358.78	29,346
354.66	640	356.74	15,524	358.82	29,521
354.70	800	356.78	15,844	358.86	29,693
354.74	960	356.82	16,163	358.90	29,863
354.78	1,119	356.86	16,480	358.94	30,029
354.82	1,279	356.90	16,797	358.98	30,192
354.86	1,439	356.94	17,112	359.02	30,353
354.90	1,599	356.98	17,426	359.06	30,512
354.94	1,759	357.02	17,739	359.10	30,672
354.98	1,919	357.06	18,050	359.14	30,832
355.02	2,079	357.10	18,361	359.18	30,992
355.06	2,239	357.14	18,669	359.22	31,152
355.10	2,399	357.18	18,977	359.26	31,312
355.14	2,559	357.22	19,283	359.30	31,472
355.18	2,719	357.26	19,587	359.34	31,632
355.22	2,879	357.30	19,890	359.38	31,792
355.26	3,085	357.34	20,191	359.42	31,952
355.30	3,433	357.38	20,491	359.46	32,112
355.34	3,780	357.42	20,789	359.50	32,272
355.38	4,127	357.46	21,085	359.54	32,431
355.42	4,473	357.50	21,380	359.58	32,591
355.46	4,819	357.54	21,673	359.62	32,751
355.50	5,164	357.58	21,964	359.66	32,911
355.54	5,508	357.62	22,253	359.70	33,071
355.58	5,852	357.66	22,540	359.74	33,231
355.62	6,196	357.70	22,825	359.78	33,391
355.66	6,538	357.74	23,108	359.82	33,551
355.70	6,881	357.78	23,389	359.86	33,711
355.74	7,222	357.82	23,667	359.90	33,871
355.78	7,563	357.86	23,944	359.94	34,031
355.82	7,904	357.90	24,218	359.98	**34,191**
355.86	8,244	357.94	24,490		
355.90	8,583	357.98	24,759		
355.94	8,921	358.02	25,025		
355.98	9,259	358.06	25,289		
356.02	9,596	358.10	25,550		
356.06	9,933	358.14	25,808		
356.10	10,269	358.18	26,064		
356.14	10,603	358.22	26,316		
356.18	10,938	358.26	26,564		
356.22	11,271	358.30	26,809		
356.26	11,604	358.34	27,051		
356.30	11,935	358.38	27,288		
356.34	12,266	358.42	27,522		
356.38	12,596	358.46	27,750		
356.42	12,925	358.50	27,973		
356.46	13,254	358.54	28,191		
356.50	13,581	358.58	28,401		
356.54	13,908	358.62	28,603		

Summary for Pond BMP-4: BMP-4

Inflow Area = 5.904 ac, 58.08% Impervious, Inflow Depth = 6.73" for 100-year event
Inflow = 37.71 cfs @ 12.14 hrs, Volume= 3.313 af
Outflow = 25.43 cfs @ 12.27 hrs, Volume= 3.252 af, Atten= 33%, Lag= 7.8 min
Primary = 25.43 cfs @ 12.27 hrs, Volume= 3.252 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 337.08' @ 12.27 hrs Surf.Area= 8,735 sf Storage= 26,690 cf

Plug-Flow detention time= 53.3 min calculated for 3.252 af (98% of inflow)
Center-of-Mass det. time= 42.1 min (828.0 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	332.50'	12,084 cf	**58.58'W x 149.10'L x 5.50'H Field A** 48,041 cf Overall - 17,831 cf Embedded = 30,211 cf x 40.0% Voids
#2A	333.25'	17,831 cf	**ADS_StormTech MC-3500 d +Cap** x 160 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 160 Chambers in 8 Rows Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf
		29,915 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	333.25'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 333.25' / 332.95' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.43 cfs @ 12.27 hrs HW=337.08' (Free Discharge)
↑**1=Culvert** (Inlet Controls 25.43 cfs @ 8.09 fps)

Pond BMP-4: BMP-4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 8 rows = 238.4 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

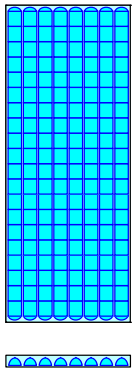
20 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 147.10' Row Length +12.0" End Stone x 2 = 149.10' Base Length
8 Rows x 77.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 58.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

160 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 8 Rows = 17,830.7 cf Chamber Storage

48,041.3 cf Field - 17,830.7 cf Chambers = 30,210.6 cf Stone x 40.0% Voids = 12,084.2 cf Stone Storage

Chamber Storage + Stone Storage = 29,914.9 cf = 0.687 af
Overall Storage Efficiency = 62.3%
Overall System Size = 149.10' x 58.58' x 5.50'

160 Chambers
1,779.3 cy Field
1,118.9 cy Stone



Stage-Area-Storage for Pond BMP-4: BMP-4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
332.50	0	334.58	12,422	336.66	25,132
332.54	140	334.62	12,705	336.70	25,296
332.58	280	334.66	12,987	336.74	25,456
332.62	419	334.70	13,268	336.78	25,611
332.66	559	334.74	13,548	336.82	25,764
332.70	699	334.78	13,827	336.86	25,915
332.74	839	334.82	14,105	336.90	26,063
332.78	978	334.86	14,383	336.94	26,208
332.82	1,118	334.90	14,659	336.98	26,351
332.86	1,258	334.94	14,934	337.02	26,491
332.90	1,398	334.98	15,208	337.06	26,631
332.94	1,537	335.02	15,481	337.10	26,770
332.98	1,677	335.06	15,752	337.14	26,910
333.02	1,817	335.10	16,023	337.18	27,050
333.06	1,957	335.14	16,293	337.22	27,190
333.10	2,096	335.18	16,561	337.26	27,329
333.14	2,236	335.22	16,828	337.30	27,469
333.18	2,376	335.26	17,093	337.34	27,609
333.22	2,516	335.30	17,358	337.38	27,749
333.26	2,696	335.34	17,621	337.42	27,888
333.30	3,000	335.38	17,882	337.46	28,028
333.34	3,303	335.42	18,142	337.50	28,168
333.38	3,605	335.46	18,401	337.54	28,308
333.42	3,907	335.50	18,658	337.58	28,447
333.46	4,208	335.54	18,913	337.62	28,587
333.50	4,509	335.58	19,167	337.66	28,727
333.54	4,810	335.62	19,419	337.70	28,867
333.58	5,110	335.66	19,670	337.74	29,007
333.62	5,410	335.70	19,919	337.78	29,146
333.66	5,709	335.74	20,166	337.82	29,286
333.70	6,007	335.78	20,411	337.86	29,426
333.74	6,305	335.82	20,654	337.90	29,566
333.78	6,603	335.86	20,895	337.94	29,705
333.82	6,900	335.90	21,134	337.98	**29,845**
333.86	7,196	335.94	21,372		
333.90	7,492	335.98	21,607		
333.94	7,788	336.02	21,839		
333.98	8,082	336.06	22,069		
334.02	8,377	336.10	22,297		
334.06	8,670	336.14	22,523		
334.10	8,963	336.18	22,745		
334.14	9,255	336.22	22,965		
334.18	9,547	336.26	23,182		
334.22	9,838	336.30	23,396		
334.26	10,128	336.34	23,607		
334.30	10,417	336.38	23,815		
334.34	10,706	336.42	24,018		
334.38	10,994	336.46	24,218		
334.42	11,281	336.50	24,413		
334.46	11,567	336.54	24,602		
334.50	11,853	336.58	24,786		
334.54	12,138	336.62	24,963		

Summary for Link POA-3: POA-3 DMH discharging to 30"D RCP to Hilltop Road

Inflow Area = 38.103 ac, 39.70% Impervious, Inflow Depth = 6.02" for 100-year event
Inflow = 141.78 cfs @ 12.21 hrs, Volume= 19.112 af
Primary = 141.78 cfs @ 12.21 hrs, Volume= 19.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-4: POA-4 To NW corner of Franklin Crossing Condominium

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth = 4.87" for 100-year event
Inflow = 1.14 cfs @ 12.14 hrs, Volume= 0.093 af
Primary = 1.14 cfs @ 12.14 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-5: POA-5 SE corner to Franklin Crossing Condominium

Inflow Area = 3.319 ac, 31.26% Impervious, Inflow Depth = 5.46" for 100-year event
Inflow = 14.55 cfs @ 12.12 hrs, Volume= 1.510 af
Primary = 14.55 cfs @ 12.12 hrs, Volume= 1.510 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-6: POA-6 "D-Series" Wetland

Inflow Area = 2.024 ac, 0.00% Impervious, Inflow Depth = 5.58" for 100-year event
Inflow = 11.38 cfs @ 12.14 hrs, Volume= 0.941 af
Primary = 11.38 cfs @ 12.14 hrs, Volume= 0.941 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-7: POA-7 12" D RCP to Old West Central Street

Inflow Area = 2.001 ac, 63.27% Impervious, Inflow Depth = 8.76" for 100-year event
Inflow = 20.09 cfs @ 12.27 hrs, Volume= 1.461 af
Primary = 20.09 cfs @ 12.27 hrs, Volume= 1.461 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-8: POA-8 "E-Series" Wetland

Inflow Area = 0.911 ac, 0.00% Impervious, Inflow Depth = 4.64" for 100-year event
Inflow = 3.96 cfs @ 12.18 hrs, Volume= 0.352 af
Primary = 3.96 cfs @ 12.18 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POA-9: POA-9 Residences

Inflow Area = 0.144 ac, 0.00% Impervious, Inflow Depth = 4.64" for 100-year event
Inflow = 0.67 cfs @ 12.15 hrs, Volume= 0.056 af
Primary = 0.67 cfs @ 12.15 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

APPENDIX 3:
MANUAL CALCULATIONS

Tri-County Regional Voc Technical High School

Design Storm on 'Inlets' Sheet: 25-year

STORM DRAIN COMPUTATION SHEET 04.04.22

Section 1: Direct Inlet "Branch" Segments (Area Drains, Catch Basins, etc.)

SEGMENT			WATERSHED CHARACTERISTICS Design Frequency 25-year						PIPE CHARACTERISTICS				MANNING'S VALUES Pipe Design Depth 1.00 D						CHECK
No.	Start	End	Drain. Area	Runoff Coeff.	Time of Conc.	Rainfall Intens.	Q (min) CiA	Total Gutter Flow	Pipe Diameter D	Pipe Material	Pipe Length	Pipe Slope	n	A	R	Q (max)	Head above invert	Velocity	Q (max) > Q (min)
			acres		min	in/hr	cfs	cfs	in		ft			sf	ft		ft	fps	cfs
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1	A1-01-CB	A1-03-DMH	0.488	0.922	6.00	6.40	2.91	#N/A	12	PVC	75	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
2	A1-02-TD	A1-03-DMH	0.660	0.865	6.00	6.40	3.68	#N/A	12	PVC	72	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
3	A1-04-CB	A1-06-DMH	0.359	0.883	6.00	6.40	2.04	#N/A	12	PVC	80	0.006	0.010	0.785	0.250	3.60	-	4.6 fps	True
4	A1-05-CB	A1-06-DMH	0.567	0.950	6.00	6.40	3.48	#N/A	12	PVC	80	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
5	N. ROOF 1	A2-02-DMH	2.508	0.950	6.00	6.40	15.37	#N/A	15	PVC	80	0.050	0.010	1.227	0.313	18.83	-	15.3 fps	True
6	S. ROOF	B3-04-DMH	1.376	0.950	6.00	6.40	8.44	#N/A	18	PVC	47	0.010	0.010	1.767	0.375	13.69	-	7.7 fps	True
7	B1-01-CB	B1-03-DMH	0.313	0.950	6.00	6.40	1.92	#N/A	10	PVC	33	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
8	B1-02-CB	B1-03-DMH	0.313	0.950	6.00	6.40	1.92	#N/A	10	PVC	22	0.020	0.010	0.545	0.208	4.04	-	7.4 fps	True
9	B1-05-CB	B1-07-DMH	0.273	0.950	6.00	6.40	1.68		10	PVC	29	0.009	0.010	0.545	0.208	2.71	-	5.0 fps	True
10	B1-06-CB	B1-07-DMH	0.273	0.950	6.00	6.40	1.68		10	PVC	27	0.009	0.010	0.545	0.208	2.71	-	5.0 fps	True
11	B3-09-CB	B3-11-DMH	0.386	0.843	6.00	6.40	2.10		10	PVC	25	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
12	B3-10-CB	B3-11-DMH	0.175	0.950	6.00	6.40	1.07		10	PVC	45	0.064	0.010	0.545	0.208	7.23	-	13.2 fps	True
13	C1-01-DCB	C1-04-DMH	0.134	0.913	6.00	6.40	0.79		10	PVC	220	0.002	0.010	0.545	0.208	1.28	-	2.3 fps	True
14	C1-02-DCB	C1-04-DMH	0.025	0.950	6.00	6.40	0.15		10	PVC	34	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
15	C1-03-CB	C1-04-DMH	0.191	0.880	6.00	6.40	1.09		10	PVC	18	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
16	C1-05-CB	C1-07-DMH	0.155	0.950	6.00	6.40	0.95		8	PVC	41	0.022	0.010	0.349	0.167	2.34	-	6.7 fps	True
17	C1-06-CB	C1-07-DMH	0.436	0.922	6.00	6.40	2.60		8	PVC	52	0.190	0.010	0.349	0.167	6.87	-	19.7 fps	True
18	C1-08-CB	C1-10-DMH	0.739	0.950	6.00	6.40	4.53		15	PVC	77	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
19	C1-09-CB	C1-10-DMH	0.354	0.950	6.00	6.40	2.17		12	PVC	41	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
20	C1-12-CB	C1-14-DMH	0.242	0.950	6.00	6.40	1.48		10	PVC	86	0.011	0.010	0.545	0.208	3.00	-	5.5 fps	True
21	C1-13-CB	C1-14-DMH	0.399	0.922	6.00	6.40	2.37		10	PVC	35	0.012	0.010	0.545	0.208	3.13	-	5.7 fps	True
22	D1-25-CB	D1-27-DMH	0.891	0.950	6.00	6.40	5.46		15	PVC	94	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
23	D1-26-CB	D1-27-DMH	0.202	0.950	6.00	6.40	1.24		10	PVC	58	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
24	D1-30-DCB	D1-33-DMH	0.132	0.950	6.00	6.40	0.81		8	PVC	33	0.010	0.010	0.349	0.167	1.58	-	4.5 fps	True
25	D1-32-DCB	D1-33-DMH	0.569	0.873	6.00	6.40	3.21		12	PVC	17	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
26	D1-32-CB	D1-33-DMH	0.512	0.950	6.00	6.40	3.14		12	PVC	31	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
27	D1-01-CB	D1-04-DMH	0.108	0.950	6.00	6.40	**0.66**		8	PVC	119	0.010	0.010	0.349	0.167	1.58	-	4.5 fps	True
28	D1-02-CB	D1-04-DMH	0.304	0.950	6.00	6.40	**1.86**		10	PVC	112	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
29	D1-03-CB	D1-04-DMH	0.107	0.950	6.00	6.40	**0.66**		8	PVC	46	0.010	0.010	0.349	0.167	1.58	-	4.5 fps	True
30	D1-05-CB	D1-08-DMH	0.099	0.950	6.00	6.40	**0.61**		10	PVC	30	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
31	D1-06-CB	D1-08-DMH	0.391	0.942	6.00	6.40	**2.37**		10	PVC	28	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
32	D1-07-CB	D1-08-DMH	0.040	0.950	6.00	6.40	**0.24**		10	PVC	49	0.041	0.010	0.545	0.208	5.78	-	10.6 fps	True
33	D1-11-FIELD	D1-13-DMH	1.049	0.671	6.00	6.40	**4.54**		15	PVC	73	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
34	D1-12-CV	D1-13-DMH	0.205	0.862	6.00	6.40	**1.14**		10	PVC	21	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
35	D1-14-CB	D1-17-DMH	0.071	0.950	6.00	6.40	**0.43**		8	PVC	149	0.044	0.010	0.349	0.167	3.30	-	9.5 fps	True
36	D1-15-CB	D1-17-DMH	0.113	0.824	6.00	6.40	**0.60**		8	PVC	13	0.010	0.010	0.349	0.167	1.58	-	4.5 fps	True
37	D1-16-CB	D1-17-DMH	0.039	0.950	6.00	6.40	**0.24**		8	PVC	10	0.010	0.010	0.349	0.167	1.58	-	4.5 fps	True
38	D1-20-FIELD	D1-23-DMH	0.953	0.671	6.00	6.40	**4.12**		12	PVC	80	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
39	D1-21-CB	D1-23-DMH	0.371	0.803	6.00	6.40	**1.92**		10	PVC	14	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
40	D1-22-CB	D1-23-DMH	0.153	0.915	6.00	6.40	**0.90**		10	PVC	13	0.010	0.010	0.545	0.208	2.86	-	5.2 fps	True
41	E-01-CB	E-02-DMH	0.136	0.927	6.00	6.40	**0.81**		12	PVC	66	0.097	0.010	0.785	0.250	14.46	-	18.4 fps	True
42	E-03-CB	E-04-DMH	0.105	0.950	6.00	6.40	**0.65**		12	PVC	6	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
43	E-05-CB	E-06-DMH	0.098	0.950	6.00	6.40	**0.60**		12	PVC	6	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
44		Ex 12" RCP	0.487	0.950	6.00	6.40	**2.99**		12		287	0.036	0.013	0.785	0.250	6.77	-	8.6 fps	True
45			0.633	0.671	6.00	6.40	**2.74**												

STORM DRAIN COMPUTATION SHEET

Section 2: Main Line "Trunk" Segments (Drain Basins, Manholes, etc.)

SEGMENT			WATERSHED CHARACTERISTICS Design Frequency 25-year		PIPE CHARACTERISTICS				MANNING'S VALUES Pipe Design Depth 1.00 D						CHECK
No.	Start	End	Q (min)	Total Gutter Flow cfs	Pipe Diameter in	Pipe Material	Pipe Length ft	Pipe Slope	n	A sf	R ft	Q (max)	Head above invert ft	Velocity fps	Q (max) > Q (min) cfs
(1)	(2)	(3)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1	A1-03-DMH	A1-06-DMH	6.59	-	15	PVC	55	0.010	0.010	1.227	0.313	8.42	-	7.7 fps	True
2	A1-06-DMH	A1-07-WQU	6.59		15	PVC	8	0.010	0.010	1.227	0.313	8.42	-	7.7 fps	True
3	A1-07-WQU	DET TANK 1	5.52		15	PVC	7	0.010	0.010	1.227	0.313	8.42	-	7.5 fps	True
4	A2-02-DMH	DET TANK 1	15.37		15	PVC	6	0.010	0.010	1.227	0.313	8.42	6.96	6.9 fps	False
5	B1-03-DMH	B1-04-DMH	3.83		24	PVC	145	0.005	0.010	3.142	0.500	20.85	-	4.5 fps	True
6	B1-04-DMH	B1-07-DMH	3.83		12	PVC	10	0.020	0.010	0.785	0.250	6.57	-	8.8 fps	True
7	B1-05-DMH	B1-07-DMH	1.68		12	PVC	8	0.051	0.010	0.785	0.250	10.49	-	8.6 fps	True
8	B1-06-DMH	B1-08-WQU	5.51		12	PVC	42	0.010	0.010	0.785	0.250	4.64	2.49	5.9 fps	False
9	B1-08-WQU	DET TANK 2	5.51		12	PVC	22	0.010	0.010	0.785	0.250	4.64	2.49	5.9 fps	False
10	B2-04-DMH	DET TANK 2	8.44		18	PVC	78	0.010	0.010	1.767	0.375	13.69	-	8.3 fps	True
11	DET TANK 1	B3-03-DMH	9.04		18	PVC	157	0.010	0.010	1.767	0.375	13.69	-	8.4 fps	True
12	B3-03-DMH	B3-04-DMH	9.04		18	PVC	50	0.010	0.010	1.767	0.375	13.69	-	8.4 fps	True
13	B3-04-DMH	B3-05-DMH	9.04		18	PVC	115	0.016	0.010	1.767	0.375	17.32	-	9.9 fps	True
14	B3-05-DMH	B3-08-DMH	9.04		18	PVC	106	0.010	0.010	1.767	0.375	13.69	-	8.4 fps	True
15	DET TANK 2	B3-08-DMH	12.68		21	PVC	71	0.010	0.010	2.405	0.438	20.65	-	9.2 fps	True
16	B3-08-DMH	B3-11-DMH	21.72		21	PVC	492	0.014	0.010	2.405	0.438	24.44	-	11.6 fps	True
17	C1-04-DMH	C1-07-DMH			15	PVC	98	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
18	C1-07-DMH	C1-11-DMH			12	PVC	21	0.228	0.010	0.785	0.250	22.18	-	28.2 fps	True
19	C1-10-DMH	C1-11-DMH			18	PVC	10	0.012	0.010	1.767	0.375	15.00	-	8.5 fps	True
20	C1-11-DMH	C1-15-DMH			18	PVC	12	0.007	0.010	1.767	0.375	11.46	-	6.5 fps	True
21	C1-14-DMH	C1-15-DMH			18	PVC	7	0.014	0.010	1.767	0.375	16.20	-	9.2 fps	True
22	C1-15-DMH	C1-16-WQU			15	PVC	8	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
23	C1-16-WQU	INF TANK 3			15	PVC	8	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
24	D1-04-DMH	D1-08-DMH			15	PVC	40	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
25	D1-08-DMH	D1-13-DMH			15	PVC	8	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
31	D1-13-DMH	D1-18-DMH			15	PVC	8	0.010	0.010	1.227	0.313	8.42	-	6.9 fps	True
32	D1-17-DMH	D1-18-DMH			18	PVC	115	0.010	0.010	1.767	0.375	13.69	-	7.7 fps	True
33	D1-18-DMH	D1-23-DMH			18	PVC	70	0.041	0.010	1.767	0.375	27.72	-	15.7 fps	True
34	D1-23-DMH	D1-24-DMH			18	PVC	70	0.045	0.010	1.767	0.375	29.05	-	16.4 fps	True
35	D1-24-DMH	D1-33-DMH			18	PVC	54	0.033	0.010	1.767	0.375	24.87	-	14.1 fps	True
36	D1-27-DMH	D1-28-DMH			18	PVC	49	0.010	0.010	1.767	0.375	13.69	-	7.7 fps	True
37	D1-28-DMH	D1-29-DMH			18	PVC	150	0.032	0.010	1.767	0.375	24.49	-	13.9 fps	True
38	D1-29-DMH	D1-30-DMH			18	PVC	218	0.021	0.010	1.767	0.375	19.84	-	11.2 fps	True
39	D1-33-DMH	D1-34-DMH			18	PVC	205	0.022	0.010	1.767	0.375	20.31	-	11.5 fps	True
40	D1-34-DMH	D1-35-WQU			18	PVC	42	0.025	0.010	1.767	0.375	21.65	-	12.3 fps	True
41	D1-35-WQU	INF TANK 4			18	PVC	12	0.127	0.010	1.767	0.375	48.80	-	27.6 fps	True
42	INF TANK 3	C2-03-DMH	6.79		12	PVC	89	0.049	0.010	0.785	0.250	10.28	-	13.1 fps	True
43	C2-03-DMH	C2-04-DMH	6.79		12	PVC	190	0.037	0.010	0.785	0.250	8.93	-	11.4 fps	True
44	C2-04-DMH	C2-05-DMH	6.79		12	PVC	105	0.025	0.010	0.785	0.250	7.34	-	9.3 fps	True
45	E-02-DMH	E-04-DMH	0.81		12	PVC	165	0.096	0.010	0.785	0.250	14.39	-	18.3 fps	True
46	E-04-DMH	E-06-DMH	1.46		12	PVC	209	0.098	0.010	0.785	0.250	14.54	-	18.5 fps	True
47	E-06-DMH	E-07-WQU	2.058		12	PVC	98	0.075	0.010	0.785	0.250	12.72	-	16.2 fps	True
48	E-07-WQU	E-08-DMH-EX	2.058		12	PVC	21	0.010	0.010	0.785	0.250	4.64	-	5.9 fps	True
58															

Project Name: Tri County Regional Vocational High School
SCI #52033.02
D3-04-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	44,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.183
I_a/P**	0.034
q_u	685
WQV	1

Q_1=	1.081 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Up-Flo® Filter

Sizing Calculator v3.0

Hydro International

Today's Date: 6/27/24

Click to Check for Newer Version

STEP 1. Enter Project and Contact Information in YELLOW Cells

Project Name:	Tri-County Regional Vocational HS	Contact Name:	Kyle Hadley
Location:	Franklin, MA	Company:	Samiotes Consultants Inc.
Development Type:	Re-development	Phone:	508 877-6688
		E-mail:	khadley@samiotes.com

HELP

STEP 2. Select Sizing Methodology

Select Sizing Methodology from Drop Down:

New Jersey DEP Certified Sizing (0.056 cfs/Module)

The Filtration System Must be Offline (Yes/No)

Yes

STEP 3. Enter Project Flow Rate Info

Water Quality Flow Rate = 1.081 cfs

Peak Flow Rate = 14.46 cfs

STEP 4. Enter Site Values

Invert Elev of Storm Drain Pipe = 335 -ft.

Pipe Diameter of Storm Drain Pipe = 18 -in.

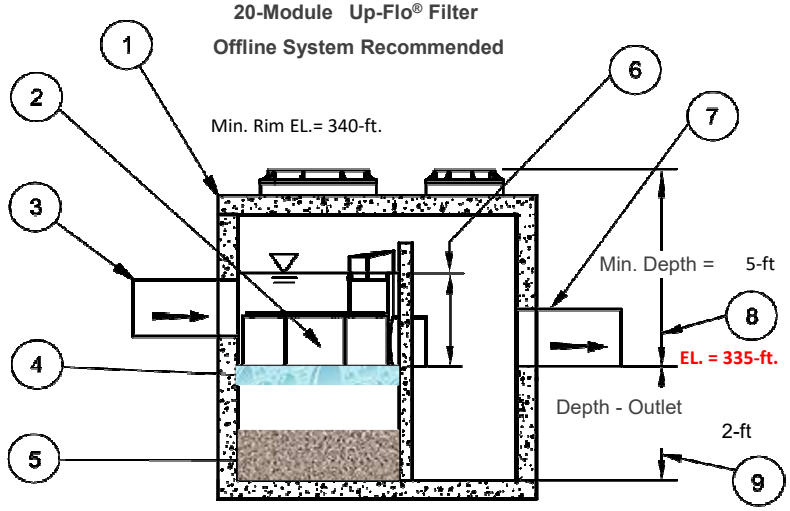
Rim Elevation = 344.04 -ft.

STEP 5. Check Output: Sizing Recommendation and Design Parameters

High Flow Bypassing Chamber Recommended
NJDEP requires all Up-Flo® Filters in NJ to be Off-Line.
Use "DWG 20-38 Modules (On or Offline)" on Worksheet 3d.

1	Number of Filter Modules Req'd	20-Module
2	Typical Filter Chamber Size	164-in x 132-in
3	Maximum Inlet Pipe Diameter	36-in
4	Oil Storage Capacity	304-gal
5	Sediment Storage Capacity	108.2 cu-ft
6	Operating Head	29.5-in
7	Max Outlet Pipe Diameter	36-in
8	Minimum Stormdrain Depth (Final Grade to Outlet Invert)	5-ft
9	Standard Depth - Outlet Invert to Sump	2-ft

20-Module Up-Flo® Filter
Offline System Recommended



Click to Submit Your Design for a Price Estimate and a Complimentary Technical Review

94 Hutchins Drive, Portland, Maine 04102 t:(207) 756-6200 f:(207) 756-6212 www.hydro-int.com

Project Name: Tri County Regional Vocational High School
SCI #52033.02
D1-30-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	105,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.183
I_a/P**	0.034
q_u	685
WQV	1

Q_1=	2.580 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Up-Flo® Filter

Sizing Calculator v3.0

Hydro International

Today's Date: 6/27/24

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STEP 1. Enter Project and Contact Information in YELLOW Cells

Project Name:	Tri-County Regional Vocational HS	Contact Name:	Kyle Hadley
Location:	Franklin, MA	Company:	Samiotes Consultants Inc.
Development Type:	Re-development	Phone:	508 877-6688
		E-mail:	khadley@samiotes.com

HELP

STEP 2. Select Sizing Methodology

Select Sizing Methodology from Drop Down:

New Jersey DEP Certified Sizing (0.056 cfs/Module)

The Filtration System Must be Offline (Yes/No)

Yes

STEP 3. Enter Project Flow Rate Info

Water Quality Flow Rate = 2.580 cfs

Peak Flow Rate = 13.93 cfs

STEP 4. Enter Site Values

Invert Elev of Storm Drain Pipe = 334.17 -ft.

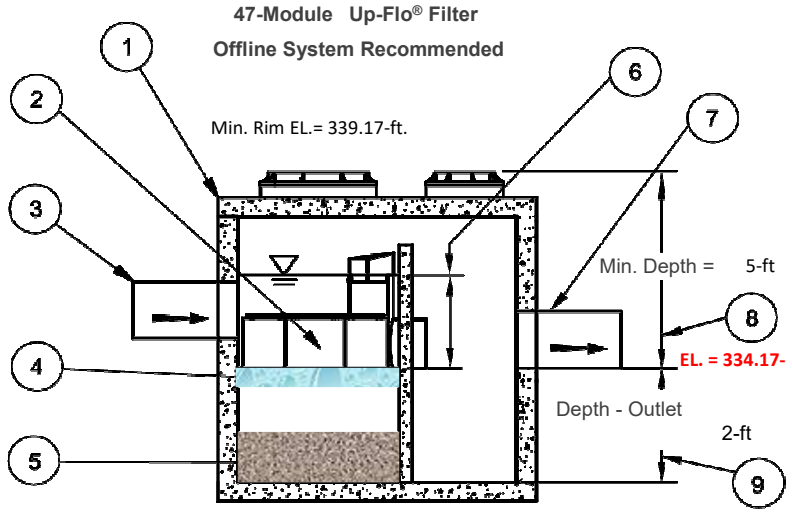
Pipe Diameter of Storm Drain Pipe = 15 -in.

Rim Elevation = 344.3 -ft.

STEP 5. Check Output: Sizing Recommendation and Design Parameters

*****High Flow Bypassing Chamber Recommended*****
NJDEP requires all Up-Flo® Filters in NJ to be Off-Line.
Use "DWG 39-57 Modules (On or Offline)" on Worksheet 3e.

1	Number of Filter Modules Req'd	47-Module
2	Typical Filter Chamber Size	164-in x 180-in
3	Maximum Inlet Pipe Diameter	36-in
4	Oil Storage Capacity	456-gal
5	Sediment Storage Capacity	162.3 cu-ft
6	Operating Head	29.5-in
7	Max Outlet Pipe Diameter	36-in
8	Minimum Stormdrain Depth (Final Grade to Outlet Invert)	5-ft
9	Standard Depth - Outlet Invert to Sump	2-ft



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94 Hutchins Drive, Portland, Maine 04102 t:(207) 756-6200 f:(207) 756-6212 www.hydro-int.com

Project Name: Tri County Regional Vocational High School
SCI #52033.02
C1-16-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	87,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	2.415 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Up-Flo® Filter

Sizing Calculator v3.0

Hydro International

Today's Date: 6/27/24

Click to Check for Newer Version

STEP 1. Enter Project and Contact Information in YELLOW Cells

Project Name:	Tri-County Regional Vocational HS	Contact Name:	Kyle Hadley
Location:	Franklin, MA	Company:	Samiotes Consultants Inc.
Development Type:	Re-development	Phone:	508 877-6688
		E-mail:	khadley@samiotes.com

HELP

STEP 2. Select Sizing Methodology

Select Sizing Methodology from Drop Down:

New Jersey DEP Certified Sizing (0.056 cfs/Module)

The Filtration System Must be Offline (Yes/No)

Yes

STEP 3. Enter Project Flow Rate Info

Water Quality Flow Rate = 2.415 cfs

Peak Flow Rate = 16.27 cfs

STEP 4. Enter Site Values

Invert Elev of Storm Drain Pipe = 357.55 -ft.

Pipe Diameter of Storm Drain Pipe = 24 -in.

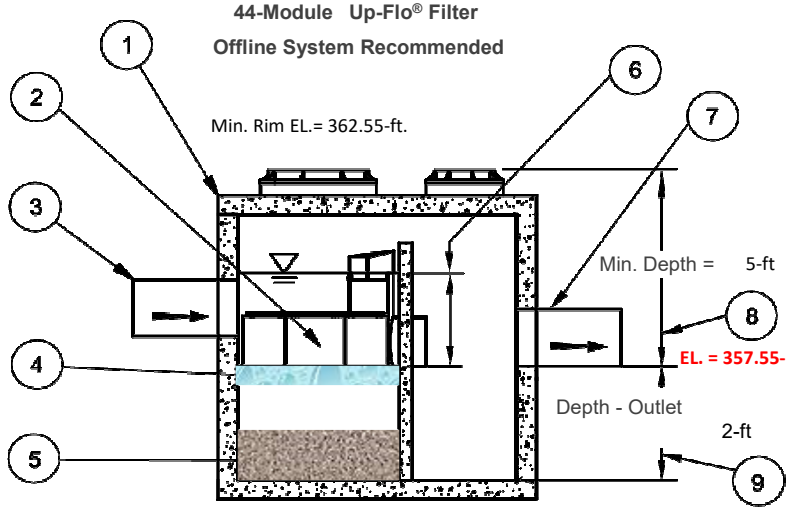
Rim Elevation = 363.66 -ft.

STEP 5. Check Output: Sizing Recommendation and Design Parameters

*****High Flow Bypassing Chamber Recommended*****
NJDEP requires all Up-Flo® Filters in NJ to be Off-Line.
Use "DWG 39-57 Modules (On or Offline)" on Worksheet 3e.

1	Number of Filter Modules Req'd	44-Module
2	Typical Filter Chamber Size	164-in x 180-in
3	Maximum Inlet Pipe Diameter	36-in
4	Oil Storage Capacity	456-gal
5	Sediment Storage Capacity	162.3 cu-ft
6	Operating Head	29.5-in
7	Max Outlet Pipe Diameter	36-in
8	Minimum Stormdrain Depth (Final Grade to Outlet Invert)	5-ft
9	Standard Depth - Outlet Invert to Sump	2-ft

44-Module Up-Flo® Filter
Offline System Recommended



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94 Hutchins Drive, Portland, Maine 04102 t:(207) 756-6200 f:(207) 756-6212 www.hydro-int.com

Project Name: Tri County Regional Vocational High School
SCI #52033.02
A1-06-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	60,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	1.666 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Up-Flo® Filter

Sizing Calculator v3.0

Hydro International

Today's Date: 6/27/24

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STEP 1. Enter Project and Contact Information in YELLOW Cells

Project Name:	Tri-County Regional Vocational HS	Contact Name:	Kyle Hadley
Location:	Franklin, MA	Company:	Samiotes Consultants Inc.
Development Type:	Re-development	Phone:	508 877-6688
		E-mail:	khadley@samiotes.com

HELP

STEP 2. Select Sizing Methodology

Select Sizing Methodology from Drop Down:

New Jersey DEP Certified Sizing (0.056 cfs/Module)

The Filtration System Must be Offline (Yes/No)

Yes

STEP 3. Enter Project Flow Rate Info

Water Quality Flow Rate = 1.666 cfs

Peak Flow Rate = 8.07 cfs

STEP 4. Enter Site Values

Invert Elev of Storm Drain Pipe = 372.19 -ft.

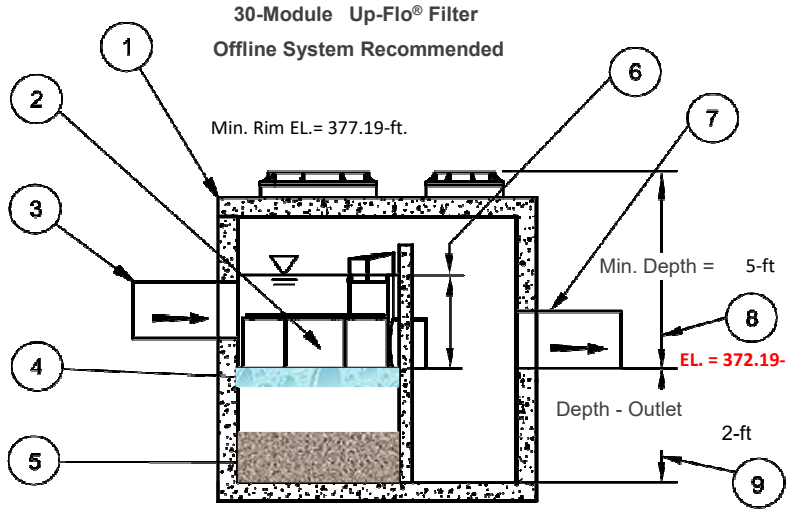
Pipe Diameter of Storm Drain Pipe = 15 -in.

Rim Elevation = 377.4 -ft.

STEP 5. Check Output: Sizing Recommendation and Design Parameters

*****High Flow Bypassing Chamber Recommended*****
NJDEP requires all Up-Flo® Filters in NJ to be Off-Line.
Use "DWG 20-38 Modules (On or Offline)" on Worksheet 3d.

1	Number of Filter Modules Req'd	30-Module
2	Typical Filter Chamber Size	164-in x 132-in
3	Maximum Inlet Pipe Diameter	36-in
4	Oil Storage Capacity	304-gal
5	Sediment Storage Capacity	108.2 cu-ft
6	Operating Head	29.5-in
7	Max Outlet Pipe Diameter	36-in
8	Minimum Stormdrain Depth (Final Grade to Outlet Invert)	5-ft
9	Standard Depth - Outlet Invert to Sump	2-ft



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Project Name: Tri County Regional Vocational High School
SCI #52033.02
B1-09-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	35,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.116
I_a/P**	0.034
q_u	755
WQV	1

Q_1=	0.948 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=3.587x10^{-8}

Up-Flo® Filter
Sizing Calculator v3.0

Hydro International

Today's Date: 6/27/24

Click to Check for Newer Version

STEP 1. Enter Project and Contact Information in YELLOW Cells

Project Name:	Tri-County Regional Vocational HS	**Contact Name:**	Kyle Hadley
Location:	Franklin, MA	**Company:**	Samiotes Consultants Inc.
Development Type:	Re-development	**Phone:**	508 877-6688
		E-mail:	khadley@samiotes.com

HELP

STEP 2. Select Sizing Methodology

Select Sizing Methodology from Drop Down:

New Jersey DEP Certified Sizing (0.056 cfs/Module)

The Filtration System Must be Offline (Yes/No)

Yes

STEP 3. Enter Project Flow Rate Info

Water Quality Flow Rate = 0.948 cfs

Peak Flow Rate = 10.33 cfs

STEP 4. Enter Site Values

Invert Elev of Storm Drain Pipe = 370.36 -ft.

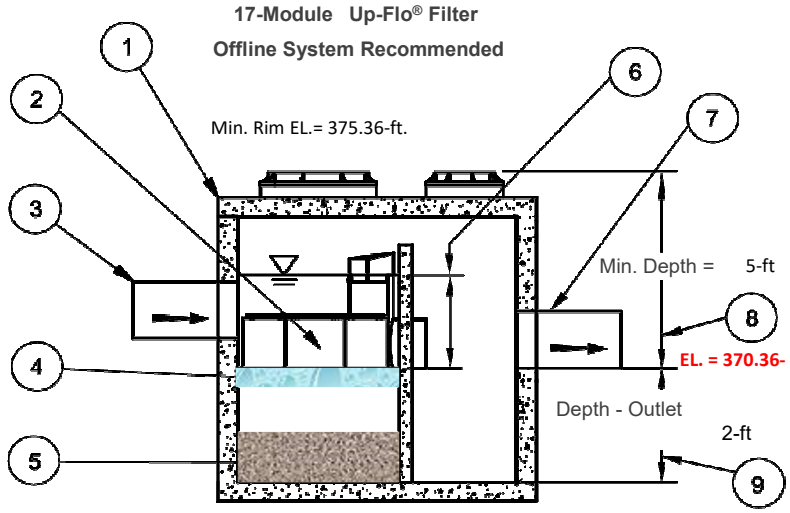
Pipe Diameter of Storm Drain Pipe = 18 -in.

Rim Elevation = 378 -ft.

STEP 5. Check Output: Sizing Recommendation and Design Parameters

*****High Flow Bypassing Chamber Recommended*****
NJDEP requires all Up-Flo® Filters in NJ to be Off-Line.
Use "DWG 8-19 Modules (On or Offline)" on Worksehet 3c.

1	Number of Filter Modules Req'd	17-Module
2	Typical Filter Chamber Size	86-in x 126-in
3	Maximum Inlet Pipe Diameter	36-in
4	Oil Storage Capacity	209-gal
5	Sediment Storage Capacity	55.9 cu-ft
6	Operating Head	29.5-in
7	Max Outlet Pipe Diameter	36-in
8	Minimum Stormdrain Depth (Final Grade to Outlet Invert)	5-ft
9	Standard Depth - Outlet Invert to Sump	2-ft



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Project Name: Tri County Regional Vocational High School
SCI #52033.02
E-08-WQU

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	13,000
ft^2/mi^2	0.000000035870
CN	98
Tc	0.168
I_a/P**	0.034
q_u	700
WQV	1

U

Q_1=	0.326 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Project Name: Tri County Regional Vocational High School
SCI #52033.02
B3-11-DMH (REBUILT WQU)

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	18,700
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

U

Q_1=	0.519 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Figure 3: For First 1-inch Runoff, Ia/P Curve = 0.034, Relationship Between Unit Peak Discharge and Time of Concentration for NRCS Type III Storm Distribution

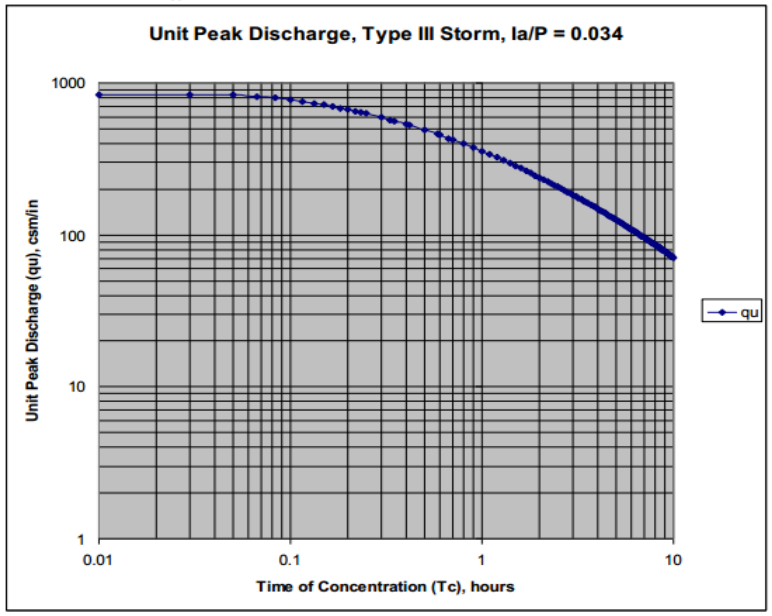


Figure 4: for First 1-inch Runoff, Table of qu values for Ia/P Curve = 0.034, listed by tc, for Type III Stor Distribution

Tc (Hours)	qu (csm/in)	Tc (Hours)	qu (csm/in)	Tc (Hours)	qu (csm/in)
0.01	835	2.7	197	7.1	95
0.03	835	2.8	192	7.2	94
0.05	831	2.9	187	7.3	93
0.067	814	3	183	7.4	92
0.083	795	3.1	179	7.5	91
0.1	774	3.2	175	7.6	90
0.116	755	3.3	171	7.7	89
0.133	736	3.4	168	7.8	88
0.15	717	3.5	164	7.9	87
0.167	700	3.6	161	8	86
0.183	685	3.7	158	8.1	85
0.2	669	3.8	155	8.2	84
0.217	654	3.9	152	8.3	84
0.233	641	4	149	8.4	83
0.25	628	4.1	146	8.5	82
0.3	593	4.2	144	8.6	81
0.333	572	4.3	141	8.7	80
0.35	563	4.4	139	8.8	79
0.4	536	4.5	137	8.9	79
0.416	528	4.6	134	9	78
0.5	491	4.7	132	9.1	77
0.583	460	4.8	130	9.2	76
0.6	454	4.9	128	9.3	76
0.667	433	5	126	9.4	75
0.7	424	5.1	124	9.5	74
0.8	398	5.2	122	9.6	74
0.9	376	5.3	120	9.7	73
1	356	5.4	119	9.8	72
1.1	339	5.5	117	9.9	72
1.2	323	5.6	115	10	71
1.3	309	5.7	114		
1.4	296	5.8	112		
1.5	285	5.9	111		
1.6	274	6	109		
1.7	264	6.1	108		
1.8	255	6.2	106		
1.9	247	6.3	105		
2	239	6.4	104		
2.1	232	6.5	102		
2.2	225	6.6	101		
2.3	219	6.7	100		
2.4	213	6.8	99		
2.5	207	6.9	98		
2.6	202	7	96		

State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Division of Water Quality
Bureau of Nonpoint Pollution Control
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
Phone: 609-633-7021 / Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. McCABE
Commissioner

August 15, 2018

David Scott, CPSWQ
Technical Product Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Laboratory Certification
Up-Flo® Filter with 450R Filter Ribbon Media by Hydro International
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Scott:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the Up-Flo® Filter with 450R Filter Ribbon Media.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated June 2018) for this device is published online at http://www.njcat.org/uploads/newDocs/UPFLO450RVerificationReportFinal.pdf.

The NJDEP certifies the use of the Up-Flo® Filter with 450R Filter Ribbon Media by Hydro International at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 0.533 gpm/sf of effective filtration treatment area.

2. The Up-Flo® Filter with 450R Filter Ribbon Media shall be installed using the same configuration as the unit verified by NJCAT and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Up-Flo® Filter with 450R Filter Ribbon Media, which is attached to this document. However, it is recommended to review the maintenance website at https://www.hydro-int.com/sites/default/files/nj_uff_inspection_and_maintnenance.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for an Up-Flo® Filter with 450R Filter Ribbon Media. After determining the number of filter modules necessary, the corresponding model selection must be appropriate to hold at least that minimum number of filters.

   Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an Up-Flo® Filter with 450R Filter Ribbon Media. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The selection of configuration for use in the Up-Flo® Filter with 450R Filter Ribbon Media is based upon both the MTFR and the maximum inflow drainage area. It is necessary to select the configuration using both methods and to rely on the method that results in the larger configuration determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the Up-Flo® Filter with 450R Filter Ribbon Media in this example is 0.25 acres. Based upon the information in Tables 1 and 2 below, the following minimum configuration is required for an Up-Flo® Filter with 450R Filter Ribbon Media to treat the impervious area without exceeding the maximum drainage area:

Drainage area = 0.25 acres
Max Allowable Inflow Area per Filter Module = 0.0245 acres/filter (Table 2 below)
0.25/0.0245 = 10.2 Filter Modules = 11 Filter Modules

Using Table 1 below, Model size UFF-ZV-25-450R with 11 filter modules and maximum allowable inflow drainage area of 0.27 acres may be used.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm/cfs=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum configuration is required for an Up-Flo® Filter with 450R Filter Ribbon Media to treat the impervious area without exceeding the MTFR:

Flow rate = 354.58 gpm
Max. Flow Rate per Filter Module = 10 gpm/Filter Module (Table 2 below)
354.58/10 = 35.46 Filter Modules = 36 Filter Modules

Using Table 1 below, Model size UFF-MH-25-450R with 36 filter modules, which would have an MTFR of 360 gpm, may be used.

The MTFR evaluation results will be used since that method results in the higher minimum configuration determined by the two methods.

The sizing table corresponding to the available system models are noted below:

Table 1: Up-Flo® Filter with 450R Filter Ribbon Media Configurations and NJDEP Sizing Table

Configuration	Model Size	Maximum Number of Filter Modules	Max. Filtration Rate (gpm)	Minimum Sedimentation Area (sq.ft.)	Minimum Wet Volume (cu.ft.)	Total Filtration Area (sq.ft.)	Total Mass Capture (lbs)	Maximum Allowable Inflow Area (acres)
Manhole	UFF-MH-450R	6	60	12.48	48.6	112.5	88.0	0.15
Vault	UFF-ZV-25-450R	50	500	104	405	937.5	733	1.22
Vault	UFF-ZV-50-450R	100	1000	208	810	1875	1466	2.44
Vault	UFF-ZV-75-450R	150	1500	312.0	1215	2813	2199	3.67

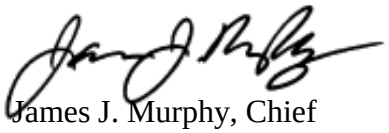
Table 2: Up-Flo® with 450R Filter Ribbon Media Design Specifications

Ribbon Model	Max. Flow per Filter Module (gpm/cfs)	Max. Allowable Inflow Area per Filter Module (acres)
450R	10/0.022	0.0245

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Nicholas Grotts of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Brian Salvo NJDEP – BNPC
Nicholas X. Grotts NJDEP – BNPC

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00

hours	**days**
36	1.50

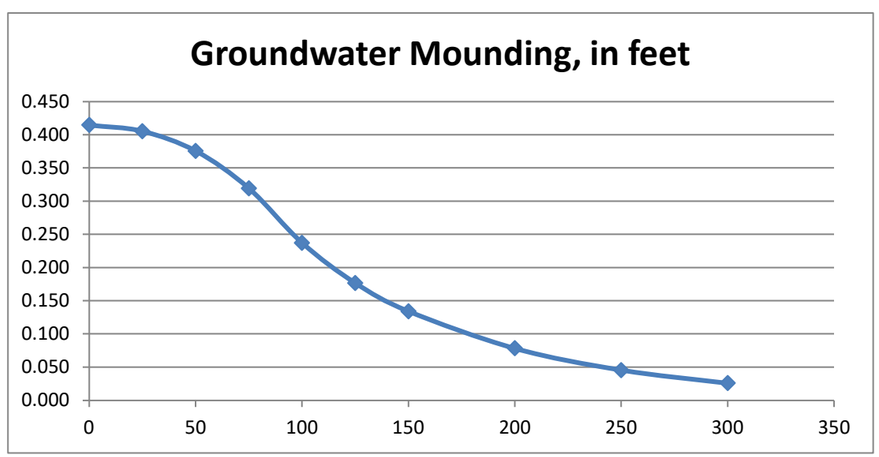
In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values		
0.3400	***R***	**Recharge (infiltration) rate (feet/day)**
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
44.31	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
86.000	**x**	**1/2 length of basin (x direction, in feet)**
30.000	**y**	**1/2 width of basin (y direction, in feet)**
1.750	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

50.415	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.415	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.415	**0**
0.405	**25**
0.376	**50**
0.319	**75**
0.237	**100**
0.177	**125**
0.134	**150**
0.078	**200**
0.045	**250**
0.026	**300**

Re-Calculate Now



Disclaimer

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00

hours	**days**
36	1.50

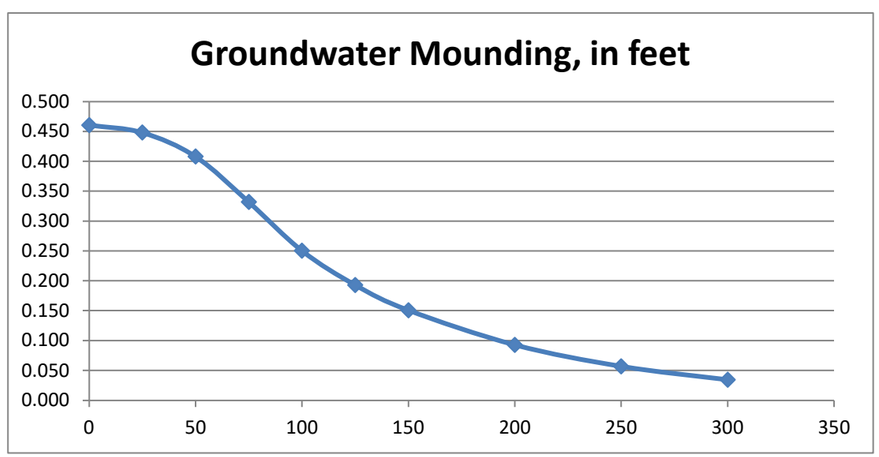
In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values		
0.3400	***R***	**Recharge (infiltration) rate (feet/day)**
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
44.31	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
75.000	**x**	**1/2 length of basin (x direction, in feet)**
35.000	**y**	**1/2 width of basin (y direction, in feet)**
2.130	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

50.461	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.461	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.461	**0**
0.448	**25**
0.408	**50**
0.332	**75**
0.250	**100**
0.193	**125**
0.151	**150**
0.093	**200**
0.057	**250**
0.034	**300**

Re-Calculate Now



Disclaimer

Project: TRI COUNTY REGIONAL VOCATIONAL HIGH SCHOOL
Location: FRANKLIN, MA SCI # : 552033.02
Calculation By: KAH Date: 05/21/24
Checked by:

RIPRAP SIZING

FES#1
pipe: proposed 24" drain line to FES #1
Area to pipe : 257,000 sf (infiltration system #4)
Pipe size (D) : 24" (D)
Storm = 25 year (4.99")
Design Discharge (Q) = 26.06 cfs
Tailwater (TW)=0.4D = 0.4
Gravity = 32.2 ft/s^2

D50 = 0.2 * D (Q/(SQRT(G)*D^2.5))^4/3 X (D/TW)

D50=1.51 FT (CALCULATED)
D50=18 IN (CALCULATED)

RIPRAP CLASS #5

MIN APRON SIZING
APRON LENGTH 7*(D) = 14 FT
APRON DEPTH (2.0*D50) = 40 IN

Project: TRI COUNTY REGIONAL VOCATIONAL HIGH SCHOOL
Location: FRANKLIN, MA SCI # : 552033.02
Calculation By: KAH Date: 05/21/24
Checked by:

RIPRAP SIZING

RIPRAP #2
pipe: proposed 24" drain line to RIPRAP from Det. System #1 & #2
Area to pipe : 306244 sf (detention system #1 and #2)
Pipe size (D) : 24" (D)
Storm = 25 year (4.99")
Design Discharge (Q) = 17.28 cfs
Tailwater (TW)=0.4D = 0.4
Gravity = 32.2 ft/s^2

D50 = 0.2 * D (Q/(SQRT(G)*D^2.5))^4/3 X (D/TW)

D50=0.87 FT (CALCULATED)
D50=10.44 IN (CALCULATED)

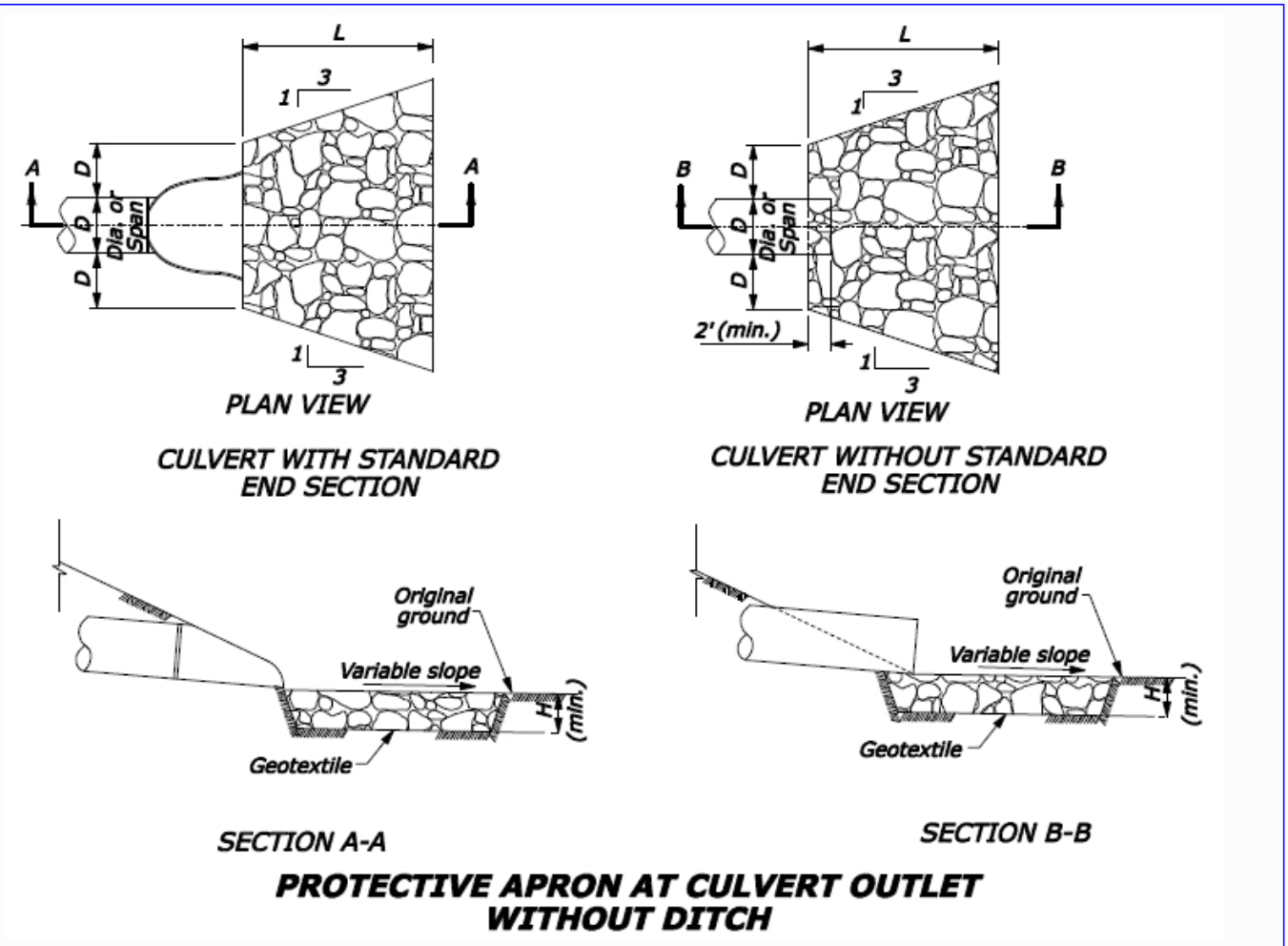
RIPRAP CLASS #4

MIN APRON SIZING
APRON LENGTH 6*(D) = 12 FT
APRON DEPTH (2.2*D50) = 23 IN

HEC 14: Riprap Apron

10.2 RIPRAP APRON

The most commonly used device for outlet protection, primarily for culverts 60 in (1500 mm) or smaller, is a riprap apron. An example schematic of an apron taken from the Central Federal Lands Division of the Federal Highway Administration is shown in Figure 10.4.



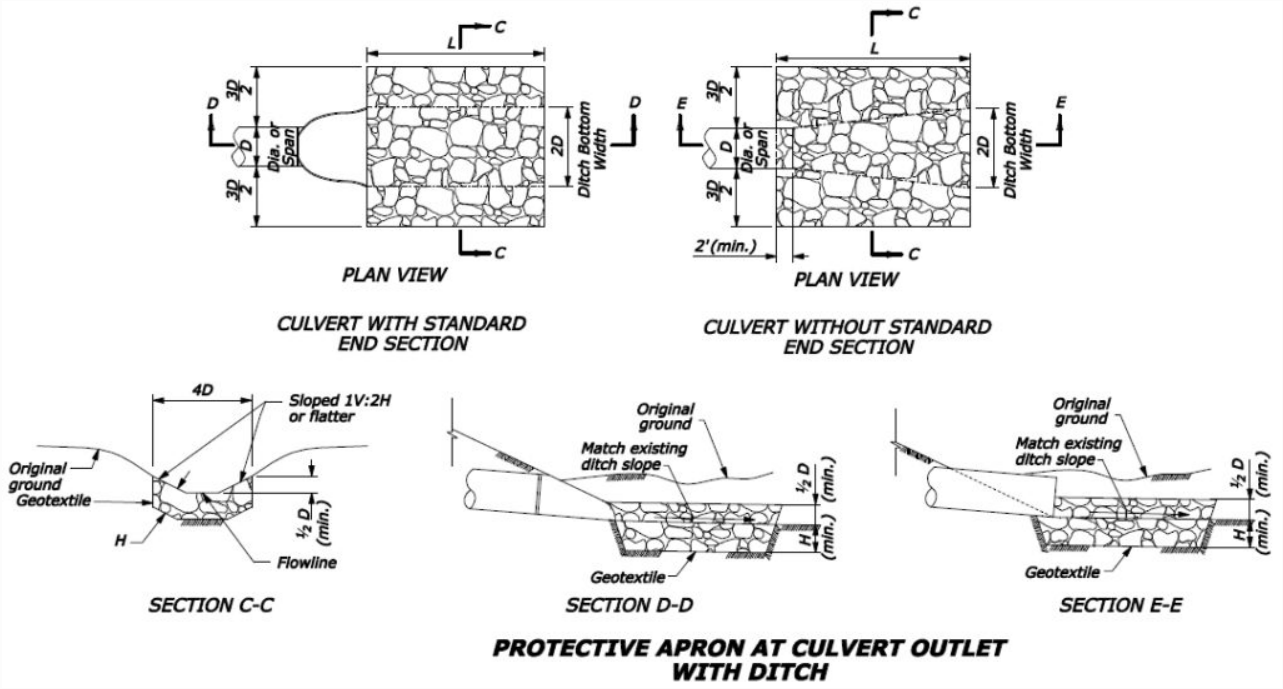


Figure 10.4. Placed Riprap at Culverts (per Central Federal Lands Highway Division Detail C251-50). Click images to enlarge.

They are constructed of riprap or grouted riprap at a zero grade for a distance that is often related to the outlet pipe diameter. These aprons do not dissipate significant energy except through increased roughness for a short distance. However, they do serve to spread the flow helping to transition to the natural drainage way or to sheet flow where no natural drainage way exists. However, if they are too short, or otherwise ineffective, they simply move the location of potential erosion downstream. The key design elements of the riprap apron are the riprap size as well as the length, width, and depth of the apron.

Several relationships have been proposed for riprap sizing for culvert aprons and several of these are discussed in greater detail in Appendix D of HEC-14. The independent variables in these relationships include one or more of the following variables: outlet velocity, rock specific gravity, pipe dimension (e.g. diameter), outlet Froude number, and tailwater. The following equation (Fletcher and Grace, 1972) is recommended for circular culverts:

$$D_{50} = 0.2 \cdot D(Q/(\sqrt{g} \cdot D^{2.5}))^{4/3}(D/TW) \quad (10.4)$$

where,

- D_{50} = riprap size, m (ft)
- Q = design discharge, m^3/s (ft^3/s)
- D = culvert diameter (circular), m (ft)
- TW = tailwater depth, m (ft)
- g = acceleration due to gravity, 9.81 m/s^2 (32.2 ft/s^2)

Tailwater depth for Equation 10.4 should be limited to between 0.4D and 1.0D. If tailwater is unknown, use 0.4D.

Whenever the flow is supercritical in the culvert, the culvert diameter is adjusted as follows:

$$D' = (D + y_n)/2 \quad (10.5)$$

where,

- D' = adjusted culvert rise, m (ft)
- y_n = normal (supercritical) depth in the culvert, m (ft)

Equation 10.4 assumes that the rock specific gravity is 2.65. If the actual specific gravity differs significantly from this value, the D_{50} should be adjusted inversely to specific gravity.

The designer should calculate D_{50} using Equation 10.4 and compare with available riprap classes. A project or design standard can be developed such as the example from the Federal Highway Administration Federal Lands Highway Division (FHWA, 2003) shown in Table 10.1 (first two columns). The class of riprap to be specified is that which has a D_{50} greater than or equal to the required size. For projects with several riprap aprons, it is often cost effective to use fewer riprap classes to simplify acquiring and installing the riprap at multiple locations. In such a case, the designer must evaluate the tradeoffs between over sizing riprap at some locations in order to reduce the number of classes required on a project.

Class	D_{50} (mm)	D_{50} (in)	Apron Length[1]	Apron Depth
1	125	4	4·D	$3.5 \cdot D_{50}$
2	150	6	4·D	$3.3 \cdot D_{50}$
3	250	10	5·D	$2.4 \cdot D_{50}$
4	350	14	6·D	$2.2 \cdot D_{50}$
5	500	20	7·D	$2.0 \cdot D_{50}$
6	550	22	8·D	$2.0 \cdot D_{50}$

[1]D is the culvert rise.

The apron dimensions must also be specified. Table 10.1 provides guidance on the apron length and depth. Apron length is given as a function of the culvert rise and the riprap size. Apron depth ranges from $3.5 \cdot D_{50}$ for the smallest

riprap to a limit of $2.0 \cdot D_{50}$ for the larger riprap sizes. The final dimension, width, may be determined using the 1:3 flare shown in Figure 10.4 and should conform to the dimensions of the downstream channel. A filter blanket should also be provided as described in HEC 11 (Brown and Clyde, 1989).

For tailwater conditions above the acceptable range for Equation 10.4 (TW > $1.0 \cdot D$), Figure 10.3 should be used to determine the velocity downstream of the culvert. The guidance in Section 10.3 may be used for sizing the riprap. The apron length is determined based on the allowable velocity and the location at which it occurs based on Figure 10.3.

Over their service life, riprap aprons experience a wide variety of flow and tailwater conditions. In addition, the relations summarized in Table 10.1 do not fully account for the many variables in culvert design. To ensure continued satisfactory operation, maintenance personnel should inspect them after major flood events. If repeated severe damage occurs, the location may be a candidate for extending the apron or another type of energy dissipator.

Design Example: Riprap Apron (CU)

Design a riprap apron for the following CMP installation. Available riprap classes are provided in Table 10.1. Given:

- $Q = 85\ ft^{3/s}$
- $D = 5.0$ ft
- $TW = 1.6$ ft

Solution

Step 1. Calculate D_{50} from Equation 10.4. First verify that tailwater is within range.

$TW/D = 1.6/5.0 = 0.32$. This is less than $0.4 \cdot D$, therefore, use $TW = 0.4 \cdot D = 0.4 \cdot 5 = 2.0$ ft.

$D_{50} = 0.2 \cdot D(Q/(\sqrt{g} \cdot D^{2.5}))^{4/3}(D/TW) = 0.2 \cdot 5.0(85/(\sqrt{32.2} \cdot 5.0^{2.5}))^{4/3}(5.0/2.0) = 0.43$ ft = 5.2 in.

Step 2. Determine riprap class. From Table 10.1, riprap class 2 (D_{50} = 6 in) is required.

Step 3. Estimate apron dimensions.

From Table 10.1 for riprap class 2,

- Length, $L = 4 \cdot D = 4 \cdot 5 = 20$ ft
- Depth = $3.3 \cdot D_{50} = 3.3 \cdot 6 = 19.8$ in = 1.65 ft

- Width (at apron end) = 3·D + (2/3)·L = 3·5 + (2/3)·20 = 28.3 ft

Design Example: Riprap Apron (SI)

Design a riprap apron for the following CMP installation. Available riprap classes are provided in Table 10.1. Given:

- Q = 2.33 m^3/s
- D = 1.5 m
- TW = 0.5 m

Solution

Step 1. Calculate D_{50} from Equation 10.4. First verify that tailwater is within range.

TW/D = 0.5/1.5 = 0.33. This is less than 0.4·D, therefore, use TW = 0.4·D = 0.4·1.5 = 0.6 m.

$D_{50} = 0.2 \cdot D(Q/(\sqrt{g} \cdot D^{2.5}))^{4/3}(D/TW) = 0.2 \cdot 1.5(2.33/(\sqrt{9.81} \cdot 1.5^{2.5}))^{4/3}(1.5/0.6) =$ 0.13 m.

Step 2. Determine riprap class. From Table 10.1, riprap class 2 (D_{50} = 0.15 m) is required.

Step 3. Estimate apron dimensions.

From Table 10.1 for riprap class 2,

- Length, L = 4·D = 4·1.5 = 6 m
- Depth = $3.3 \cdot D_{50}$ = 3.3·0.15 = 0.50 m
- Width (at apron end) = 3·D + (2/3)·L = 3·1.5 + (2/3)·6 = 8.5 m

APPENDIX 4:
SOIL REPORT

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

J3487-01-06
March 15, 2024

Tri-County Regional Vocational Technical High School
c/o DRA Architects
260 Charles Street, Suite 300
Waltham, MA 02453

Attn: Vladimir Lyubetsky

Delivered via email: VLyubetsky@draws.com
cc: Daniel Glazer via email: DGlazer@draws.com

Re: Test Pit Investigations (Existing Solar Field)
Tri-County Regional Vocational Technical High School
147 Pond Street
Franklin, Massachusetts

Dear Mr. Lyubetsky:

O'Reilly Talbot & Okun Associates, Inc. (OTO) is pleased to provide this letter report summarizing our investigations of soil and groundwater conditions for the design of stormwater management systems for the proposed Tri-County Regional Vocational Technical High School project. The new school will be located to the east (rear) of the existing school. The site is located at 147 Pond Street in Franklin, Massachusetts. A Site Locus is provided as Figure 1. This report is subject to the attached limitations.

GENERAL INFORMATION

The project includes demolition of the existing school and construction of a new school building, a small garage to the east of the new school, renovated athletic fields, parking lots and access roads, and a concession building for the new athletic fields.

The site presently contains the existing school building, asphalt paved parking lots (primarily in the southern and eastern portions of the Site) and access roads surrounding the existing school building. In addition, athletic fields are located to the northwest, and a solar field is located in the eastern portion of the Site.

Project plans call for the construction of a new school building in the eastern portion of the Site (area of the existing solar field and east parking lot). The new school building will be a slab on grade structure with a first-floor slab at elevation 380, which is several feet above existing grade in the western portion of the proposed building (area of the existing east parking lot) and near or below existing grade in the eastern portion (existing solar field area).

The project will include stormwater management systems to handle stormwater runoff generated on impervious surfaces associated with the new school. We understand that

these systems will be designed to function as either infiltration or detention systems (or a combination of both) depending on soil and groundwater conditions.

This report addresses explorations performed within or near the two proposed systems in the eastern portion of the site (east of the new school building footprint) and within the existing solar field.

SUBSURFACE EXPLORATIONS AND TESTING

Seven test pits (designated TP-106, -107, -110, -111, -114, -115, and -116) were performed at or near locations selected by the project civil engineer and within or near the proposed stormwater management systems. Locations were slightly adjusted in the field to allow access and to avoid damaging the existing solar field infrastructure. Additional explorations were performed in the vicinity of select test pit locations due to subsurface conditions observed within the test pits.

The test pits were performed on March 12, 2024 by Hersee Excavating of Stoughton, Massachusetts. Test pits were excavated using a John Deere 75G excavator equipped with a 0.5 cubic yard bucket.

Test pits TP-106, -107, and -116 were performed in the central/eastern portion of the solar field (location of eastern stormwater management system) and extended to a depth of between 7.5 to 12 feet. TP-107 encountered refusal upon bedrock at between 5 to 7.5 feet, and TP-116 encountered bedrock refusal at 10 feet. TP-110 and TP-111 were performed in the southeast portion of the solar field (location of southeastern stormwater management system), and in the vicinity of an existing stormwater basin. These test pits encountered refusal upon bedrock at between 3 to 5 feet below existing ground surface. Test pits TP-114 and TP-115 were performed along the north side of the solar field and extended to 10 feet below existing ground surface. Approximate test pit locations are shown on the attached Site Plan (Figure 2).

An OTO geotechnical engineer logged the test pits. Soil conditions are discussed below and are shown on the attached test pit logs.

Subsurface Conditions

Test Pits and Soil Conditions

Soil conditions in the test pits generally consisted of surficial layers of topsoil and organics/non-engineered fill (where encountered), followed by sandy glacial till. The presence and thickness of the fill layer varied across the Site. The fill thickness generally varied between 1.5 to 4 feet and consisted of silty sand containing various amounts of organics (roots) and topsoil layers at some locations. However, we note that the fill layer encountered in TP-106 contained significant amounts (>80 percent) of organics (wood, roots, and stumps) and extended beyond the maximum depth explored (12 feet). This highly organic fill layer was also encountered within the upper 4 feet of TP-116, and pockets were observed within the near surface fill in TP-107. We note that the lateral extent of the organic soils could not be determined during this phase of explorations due to limitations imposed by the existing solar field. Based upon the variability observed within

these test pits and our understanding of the solar field construction process, the presence of organic soils appears to be variable across the Site and additional areas of organic soils may be present.

Glacial till soils were encountered beneath the surficial soil layers. The till appeared to be relatively dense and consisted of fine sand or fine to medium sand with various amounts of coarse sand and gravel, and approximately 10 to 30 percent silt. Numerous cobbles and boulders of varying sizes were observed in the test pits. Test pits TP-114 and TP-115 terminated within the glacial till layer at a depth of 10 feet.

Bedrock was encountered beneath the glacial till soils in test pits TP-107, TP-110, TP-111, and TP-116. The bedrock consisted of granite, and appeared to be relatively intact with little to no weathered layer observed. In test pits TP-107 and TP-116, located in the central/eastern portion of the Site, bedrock was encountered at a depth of between 5 to 7.5 feet and 10 feet, respectively. At test pits TP-110 and TP-111, located in the southeastern portion of the Site, bedrock was encountered at a depth of between 3.5 to 5 feet and 3 to 4.5 feet, respectively. We note that bedrock outcrops were observed at the ground surface in the southern portion of the solar field. Based upon our explorations, site observations, and information provided to OTO, we note that the bedrock surface appears to be relatively shallow across much of the southern portion of the Site. In addition, we note that the depth to bedrock may vary considerably across relatively short distances.

Groundwater/Estimated Seasonal High Groundwater

Water Seepage Layers

Water seepage was observed at 1.5 feet in TP-114 and at 3.5 feet in TP-106, TP-115 and TP-116. However, soils below these seepage layers did not appear saturated. These seepage layers appear to consist of a water layer perched on silty soil layers or upon the dense glacial till soils.

Groundwater and Redoximorphic Features

Groundwater and saturated soils were observed within the pits at a depth of 3 feet in TP-107 and TP-110; at 4 feet in TP-111; at 8.5 feet in TP-114 and -115, and at 6.5 feet in TP-116.

Redoximorphic features indicating high groundwater were observed in each test pit except for TP-106 (none observed due to presence of organic fill). Other redoximorphic features were observed within some of the test pits. However, these appeared to be inconsistent and limited to areas around the water seepage perched on the near surface soils. Therefore, these near-surface features likely are not indications of high groundwater.

A summary of the test pits is provided in Table 1, including approximate ground surface elevation, depth to groundwater, and depth/elevation to the Estimated Seasonal High Groundwater Table (ESHGWT). Additional observations and notes are included in the attached test pit logs.

Table 1
Test Pit Information / ESHGWT

Test Pit ID	Ground Surface Elev.	Depth To		ESHGWT Depth / Elev.
		Groundwater	Redoximorphic Features	
Central/East Portion of Existing Solar Field (Eastern Stormwater System)				
TP-106	385.0’	N/E	N/E	N/A
TP-107	381.5’	3.0’	2.0’	2.0’ / 379.5’
TP-116	383.0’	6.5’	6.5’	6.5’ / 376.5’
Southeastern Portion of Existing Solar Field (Southeastern Stormwater System)				
TP-110	380.0’	3.0’	1.5’	1.5’ / 378.5’
TP-111	378.0’	4.0’	2.7’	2.7’ / 375.3’
North Portion of Existing Solar Field				
TP-114	390.3’	8.5’	8.5’	8.5’ / 381.8’
TP-115	386.3’	8.5’	8.5’	8.5’ / 377.8’

Notes:
1. “N/A” = Not Applicable (no signs of ESHGWT)
2. “N/E” = Not Encountered (or could not be determined)
3. “ESHGWT” = Estimated Seasonal High Groundwater Table

SUMMARY AND CONCLUSIONS

Based on the dense nature of near surface glacial till soils and the presence of a relatively shallow groundwater table and bedrock surface, conditions are not favorable for stormwater infiltration.

We appreciated the opportunity to be of service on this project. If you have any questions, please contact the undersigned.

Sincerely yours,
O'Reilly, Talbot & Okun Associates, Inc.

Stephen McLaughlin, EIT
Senior Project Manager

Michael J. Talbot, P.E.
Principal

Pierre J. Carriere, EIT
Engineer I

Attachments: Limitations, Site Locus, Site Plan, Test Pit Logs & Photographs

LIMITATIONS

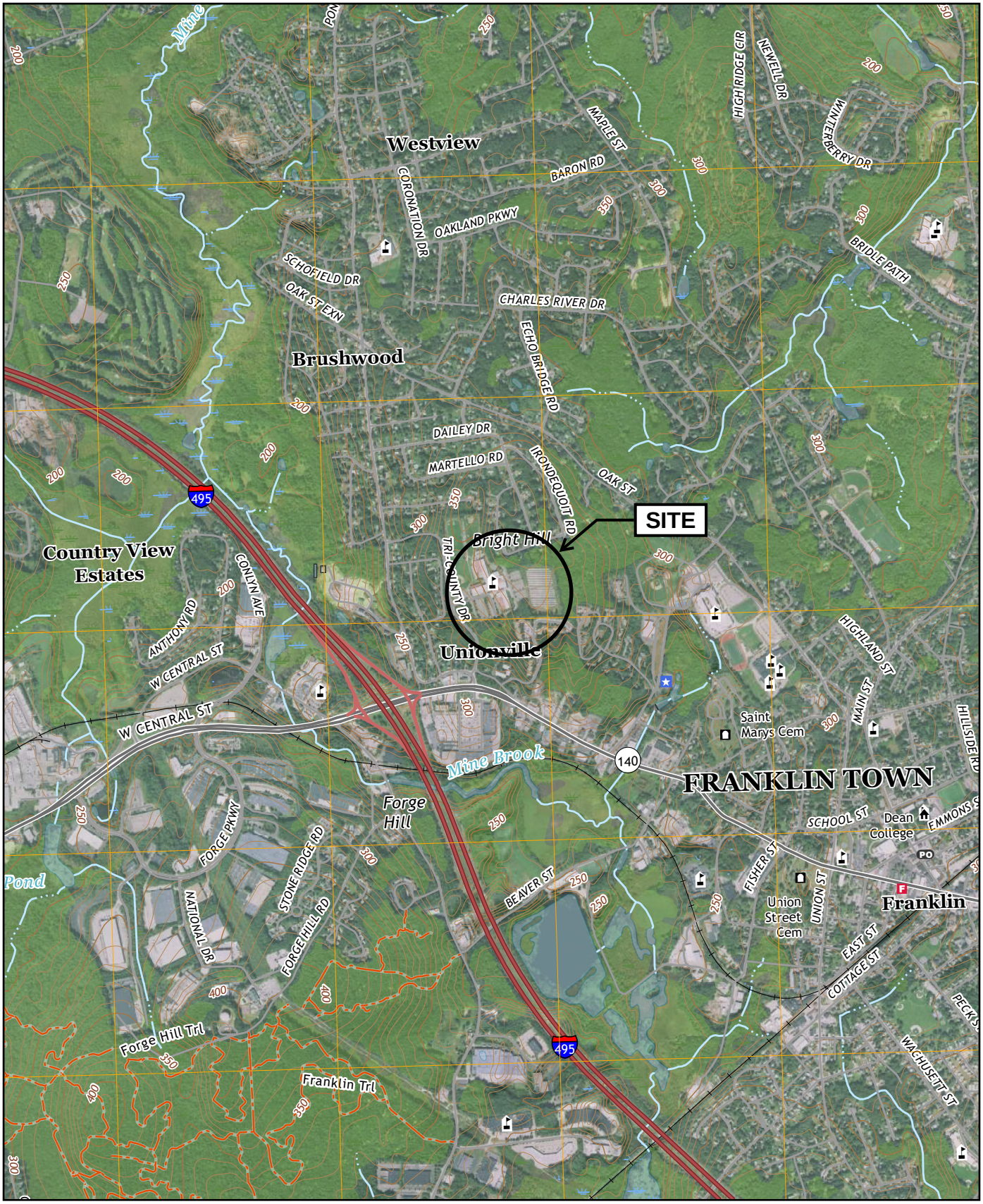
1. The observations presented in this report were made under the conditions described herein. The conclusions presented in this report were based solely upon the services described in the report and not on scientific tasks or procedures beyond the scope of the project or the time and budgetary constraints imposed by the client. The work described in this report was carried out in accordance with the Statement of Terms and Conditions attached to our proposal.

2. The analysis and recommendations submitted in this report are based in part upon the data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations of this report.

3. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

4. In the event that any changes in the nature, design or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by O'Reilly, Talbot & Okun Associates Inc. It is recommended that we be retained to provide a general review of final plans and specifications.

5. Our report was prepared for the exclusive benefit of our client. Reliance upon the report and its conclusions is not made to third parties or future property owners.



0 1000 FEET

0 0.5 1.0 MILES

0 0.5 1 KILOMETERS

1:24,000 SCALE NORTH AMERICAN VERTICAL DATUM OF 1988 10 FOOT CONTOUR INTERVAL

O:\J3400\3487 Tri-County Regional Vocational Technical High School, Franklin MA\06 Design Phase Geotech\Figures\OTO Tri-County Figure 1 - Site Locus (24k scale) Reduced.pdf

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES
293 Bridge Street, Suite 500 Springfield, MA 01103 413.788.6222
www.OTO-ENV.com

TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL

147 POND STREET
FRANKLIN, MASSACHUSETTS

SITE LOCUS

Topographic Map Quadrants: FRANKLIN, MA

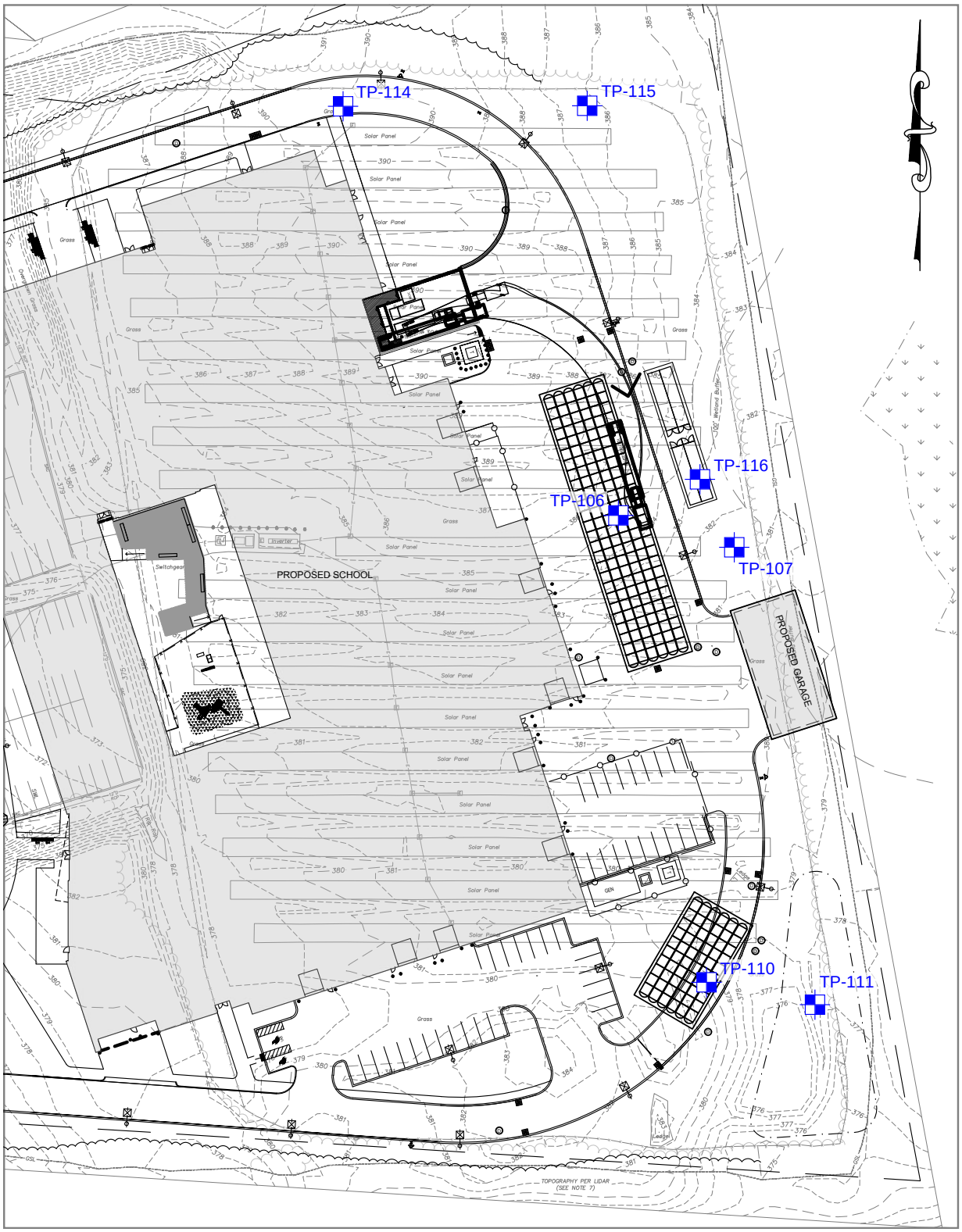
Map Version: 2021

Current As Of: 2021

Date: MARCH 2024

PROJECT No. J3487-01-06

FIGURE No. 1



NOTES:

1. BASE PLAN PROVIDED TO OTO IN ELECTRONIC FORMAT.
2. APPROXIMATE SAMPLE LOCATIONS ARE SHOWN ACCORDING TO TAPED MEASUREMENTS OR "LINE-OF-SIGHT" TAKEN FROM EXISTING SITE FEATURES.
3. ALL DATA IS TO BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHODS USED IN THE DEVELOPMENT OF THIS PLAN

LEGEND:

LOCATION OF TEST PIT PERFORMED BY HERSEE EXCAVATING ON MARCH 12, 2024, OBSERVED BY OTO

SCALE IN FEET
1" = 100'

50' 0' 100'

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES
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www.OTO-ENV.com

TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL
147 POND STREET
FRANKLIN, MASSACHUSETTS

TEST PIT LOCATION PLAN

Designed By: PJC
Drawn By: PJC
Checked By: SMM
Date: 03/15/2024
Revised Date:

PROJECT No.
J3487-01-06

FIGURE No.
2

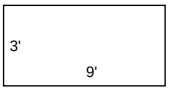
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-106

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 36°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	East portion of existing solar field	START TIME	08:00	CAPACITY (cy)	0.5
		FINISH TIME	08:30	GS ELEV. (ft)	385.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	12.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-3.5': Light gray to brown, fine SAND, some silt, little medium sand,	E	1	M	--	--	
	trace gravel, trace to little organics (roots) moist (SANDY LOAM)		1	S			
2'			5	C			
	Water seepage and wet soils observed at 3.5'						1.
4'	3.5'-12.0': Brown to dark brown, ORGANICS (wood, roots),		1	M	--	--	
	some fine to mediums sand, little silt, wet (ORGANIC FILL)		2	S			
6'			8	C			
8'							
		M					
10'							
	Tree stump encountered at 11.0'						
12'	End of exploration at 12.0'						
14'							
16'							
18'							
20'							
22'							

TEST PIT PLAN



APPROXIMATE VOLUME = 12 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes	
Est. Depth to High GW:	N/A	ft
GW Depth:	3.5	ft
GW Elevation:	381.5	ft
Elapsed Time:	N/A	min

Remarks:
1. Groundwater seepage and wet soils observed at 3.5' (elev. 381.5').
2. Organic fill present to maximum depth explored, no redoximorphic features or other signs of ESHGWT able to be observed within fill.

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-106

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-106

Test pit TP-106

TP-106 spoils pile

TP-106 spoils pile detail - organics

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-106**

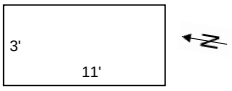
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-107

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 36°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	East portion of existing solar field	START TIME	08:35	CAPACITY (cy)	0.5
		FINISH TIME	08:55	GS ELEV. (ft)	381.5
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	7.5

DEPTH (ft)	N — SOIL DESCRIPTION — S	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-3.0': Brown, fine to medium SAND, little silt, trace organics (roots), damp (SANDY ORGANIC FILL)	E	5	C	--	--	
	(woven geotextile fabric approximately 2" below ground surface)						
1'							
2'							
	10% rust mottling (2.5 YR 4/8) at 2'						1.
	Pocket of light brown, medium to coarse sand, trace fine sand, trace silt						
3'	at south end of test pit, depth of 2.5'-3.0'. Heavy rust staining.						
	3.0'-7.0': Light brown to very light brown, fine to medium SAND,		3	C	--	--	
	trace (+) silt, wet (GLACIAL TILL; LOAMY SAND)						2.
	Groundwater seepage observed at 3.3'						
4'							
5'							
6'							
7'							
	Refusal encountered at 5.0' to 7.5' upon bedrock						
8'							
9'							
10'							
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 8.3 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes
Est. Depth to High GW:	2.0 ft
GW Depth (ft):	3.3
GW Elevation (ft):	378.2
Elapsed Time (min):	N/A

Remarks:
1. Redoximorphic features (approximately 10% rust mottling) observed at 2.0'. Estimate depth to high groundwater at 2.0'
2. Groundwater seepage observed at 3.3' (elev 378.2').

PROJECT NO.

3487-01-06

LOG OF TEST PIT

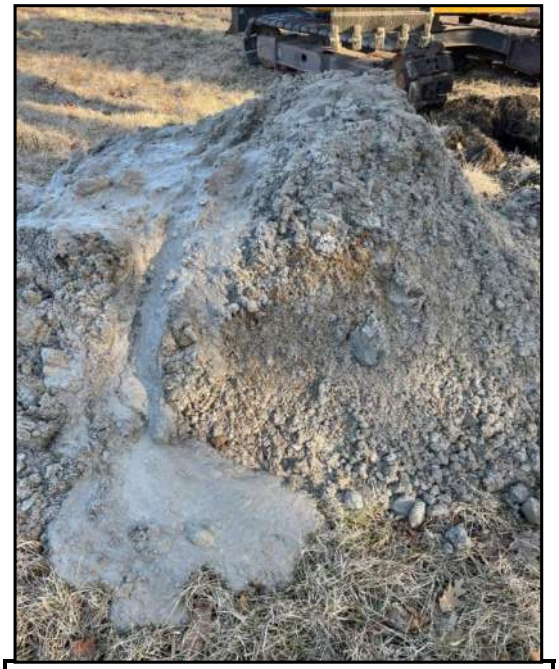
TP-107

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-107

Test pit TP-107

TP-107 spoils pile



TP-107 spoils pile

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-107**

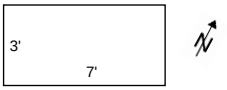
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-110

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 42°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Southeast portion of existing solar field	START TIME	09:15	CAPACITY (cy)	0.5
		FINISH TIME	09:30	GS ELEV. (ft)	380.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	5.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-0.5': Brown, fine to medium SAND, little silt, trace organics (fine roots), moist (LOAMY SAND)	E	--	--	--	--	
1'	0.5'-1.5': Dark brown, fine to medium SAND, some silt, little to trace organics (roots), moist (LOAMY SAND)						
2'	1.5'-5.0': Light brown, fine SAND and SILT, trace medium sand, trace organics (roots), moist (SANDY LOAM) 10% rust mottling (7.5 YR 4/6) at 1.5'		1 3 5	M S C	--	--	1.
3'	Groundwater seepage observed at 3.0'						2.
4'							
5'	Refusal encountered at 3.5' to 5.0' upon bedrock						
6'							
7'							
8'							
9'							
10'							
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 3.3 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes	
Est. Depth to High GW:	1.5	ft
GW Depth:	3.0	ft
GW Elevation:	377.0	ft
Elapsed Time:	N/A	min

Remarks:
1. Redoximorphic features (approximately 10% rust mottling) observed at 1.5'. Estimate depth to high groundwater at 1.5'.
2. Groundwater seepage observed at 3.0' (elev 377.0').

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-110

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-110

Test pit TP-110

TP-110 spoils pile

TP-110 spoils pile

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-110**

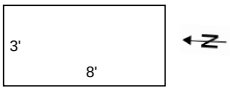
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-111

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 42°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Southeast portion of existing solar field	START TIME	09:35	CAPACITY (cy)	0.5
		FINISH TIME	09:50	GS ELEV. (ft)	378.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	4.5

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
0'	0.0'-2.7': Brown to dark brown, fine to medium SAND, some silt, little to trace organics (roots), moist (FILL; LOAMY SAND)	E	--	--	--	--	
3'	2.7'-4.5': Light brown, SILT and fine SAND, moist (SANDY LOAM) 5-10% rust mottling (7.5 YR 4/6) at 2.7'		5	C	--	--	1.
4'	Groundwater seepage observed at 4.0'						2.
	Refusal encountered at 3.0' to 4.5' upon bedrock						

TEST PIT PLAN



APPROXIMATE VOLUME = 3.3 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes	
Est. Depth to High GW:	2.7	ft
GW Depth:	4.0	ft
GW Elevation:	374.0	ft
Elapsed Time:	N/A	min

Remarks:
1. Redoximorphic features (approximately 5-10% rust mottling) observed at 2.7'. Estimate depth to high groundwater at 2.7'.
2. Groundwater seepage observed at 4.0' (elev 374.0').

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-111

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-111

Test pit TP-111

Test pit TP-111

TP-111 spoils pile

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-111**

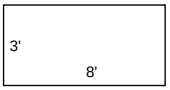
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-114

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 45°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	North portion of existing solar field	START TIME	10:40	CAPACITY (cy)	0.5
		FINISH TIME	10:55	GS ELEV. (ft)	390.3
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	10.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
1'	0.0'-1.0': Brown, fine to medium SAND and SILT, trace coarse sand, trace gravel, trace organics (fine roots), moist (SANDY LOAM)	E	--	--	--	--	
2'	1.0'-3.5': Light brown, fine to medium SAND, little coarse sand, trace (+) silt, trace gravel, damp (LOAMY SAND)		2	C			1.
	20-30% rust mottling (5 YR 5/8) between 1.0'-3.5'						2.
3'	Water seepage observed at 1.5'						
4'	3.5'-10.0': Light brown to very light gray, fine to medium SAND, little silt, little coarse sand, little gravel, moist (wet at 8.5') (GLACIAL TILL, GRAVELLY LOAMY SAND)		--	--	--	--	
5'	< 5% rust mottling between 3.5'-8.5'						3.
6'		M					
7'							
8'							
9'	Groundwater seepage, wet soils, and side wall caving observed at 8.5'						4.
	10-15% rust mottling (5 YR 5/8) at 8.5'						5.
10'							
11'	End of exploration at 10.0' due to cave in						

TEST PIT PLAN



APPROXIMATE VOLUME = 8.9 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes	
Est. Depth to High GW:	8.5	ft
GW Depth:	8.5	ft
GW Elevation:	381.8	ft
Elapsed Time:	N/A	min

Remarks:

1. Redoximorphic features (approximately 20-30% rust mottling) observed between 1.5'-3.5'.
2. Water seepage observed at 1.5' (elev. 388.8') .
3. Less than 5% redoximorphic features observed between 3.5'-8.5'.
4. Groundwater seepage, wet soils, and side wall caving observed at 8.5' (elev. 381.8').
5. Redoximorphic features (approximately 10-15% rust mottling) observed at 8.5'. Estimate depth to high groundwater at 8.5'.

PROJECT NO.

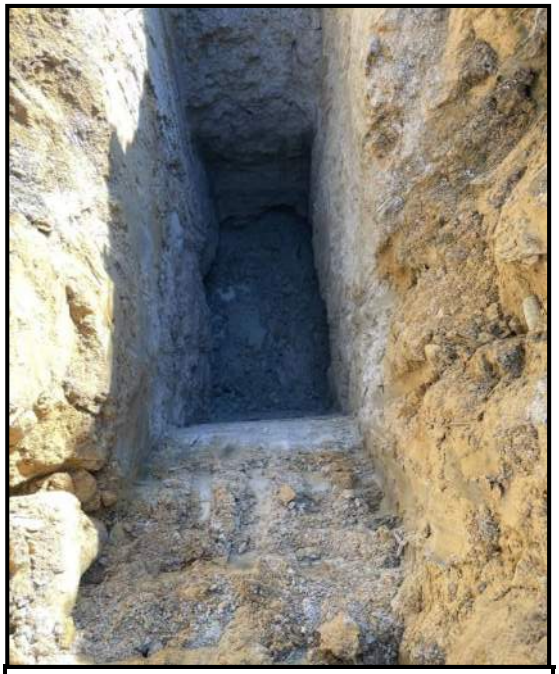
3487-01-06

LOG OF TEST PIT

TP-114

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-114



Test pit TP-114

TP-114 spoils pile

TP-114 spoils pile

Rust mottled soil from TP-114

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-114**

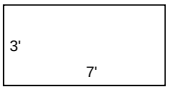
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-115

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 46°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	North portion of existing solar field	START TIME	11:10	CAPACITY (cy)	0.5
		FINISH TIME	11:35	GS ELEV. (ft)	386.3
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	10.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-1.0': Brown, fine to medium SAND and SILT, trace coarse sand, trace organics (fine roots), moist (SANDY LOAM)	M	--	--	--	--	
1'							
	1.0'-3.5': Brown to light brown, fine to medium SAND, little to trace silt, little to trace coarse sand, trace gravel, moist (LOAMY SAND) 20-30% rust mottling (5 YR 5/8) between 1.0'-3.5'		3 5	S C	--	--	1.
2'							
3'							
	Water seepage observed at 3.5'						2.
	3.5'-10.0': Very light brown to very light gray, fine to medium sand, little coarse sand, little gravel, little silt, moist (GLACIAL TILL; GRAVELLY LOAMY SAND) < 5% rust mottling between 3.5'-8.5'		--	--	--	--	3.
4'							
5'							
6'							
7'							
8'							
	Groundwater seepage, wet soils, and side wall caving observed at 8.5'						4.
9'	10-15% rust mottling (5 YR 5/8) at 8.5'						5.
10'							
	End of exploration at 10.0' due to cave in						
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 7.8 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes	
Est. Depth to High GW:	8.5	ft
GW Depth:	8.5	ft
GW Elevation:	377.8	ft
Elapsed Time:	N/A	min

Remarks:

1. Redoximorphic features (approximately 20-30% rust mottling) observed between 1.5'-3.5'.
2. Water seepage observed at 3.5' (elev. 382.8') .
3. Less than 5% redoximorphic features observed between 3.5'-8.5'.
4. Groundwater seepage, wet soils, and side wall caving observed at 8.5' (elev. 377.8').
5. Redoximorphic features (approximately 10-15% rust mottling) observed at 8.5'. Estimate depth to high groundwater at 8.5'.

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-115

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-115

Test pit TP-115

TP-115 spoils pile

TP-115 spoils pile

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-115**

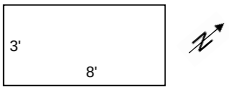
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-116

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	3/12/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Sunny, 48°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Eastern portion of existing solar field	START TIME	11:45	CAPACITY (cy)	0.5
		FINISH TIME	12:10	GS ELEV. (ft)	383.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	10.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-4.0': Dark brown to brown, fine to medium SAND,	E	1	L	--	--	
	some to little organics (roots, wood), little silt, moist		2	S			
	(SANDY ORGANIC FILL)						
1'	(woven geotextile fabric approximately 2" below ground surface)						
2'							
3'							
	Water seepage observed at 3.5'						1.
4'							
	4.0'-5.0': Very light brown, fine to medium SAND and SILT, moist	M	--	--	--	--	2.
	(SANDY LOAM)						
	20% rust mottling (5 YR 5/8) between 4.0'-5.0'						
5'							
	5.0'-10.0': Very light brown to very light gray, fine to medium SAND,		--	--	--	--	
	some silt, trace coarse sand, moist (wet and slightly clayey at 6.5')						
	(GLACIAL TILL; SANDY LOAM)						3.
6'	< 5% rust mottling (5 YR 5/8) between 5.0'-6.5'						
	Groundwater seepage, side wall caving, and wet soils observed at 6.5'						4.
	10-15% rust mottling (5 YR 5/8) at 6.5'						5.
7'							
8'							
9'							
10'							
	End of exploration at 10.0' due to cave in						
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 8.9 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes
Est. Depth to High GW:	6.5 ft
GW Depth (ft):	6.5
GW Elevation (ft):	376.5
Elapsed Time (min):	N/A

Remarks:

1. Water seepage observed at 3.5' (elev. 379.5') .
2. Redoximorphic features (approximately 20% rust mottling) observed between 4.0'-5.0'.
3. Less than 5% redoximorphic features observed between 5.0'-6.5'.
4. Groundwater seepage, wet soils, and side wall caving observed at 6.5' (elev. 376.5').
5. Redoximorphic features (approximately 10-15% rust mottling) observed at 6.5'. Estimate depth to high groundwater at 6.5'.

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-116

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-116

Test pit TP-116

TP-116 spoils pile

TP-116 spoils pile

TP-116 spoils pile with large boulder

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-116**

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

J3487-01-06
February 28, 2024

Tri-County Regional Vocational Technical High School
c/o DRA Architects
260 Charles Street, S
uite 300
Waltham, MA 02453

Attn: Vladimir Lyubetsky

Delivered via email: VLyubetsky@draws.com
cc: Daniel Glazer via email: DGlazer@draws.com

Re: Test Pit Investigations and Infiltration Testing
Tri-County Regional Vocational Technical High School
147 Pond Street
Franklin, Massachusetts

Dear Mr. Lyubetsky:

O'Reilly Talbot & Okun Associates, Inc. (OTO) is pleased to provide this letter report summarizing our investigations of soil and groundwater conditions for the design of stormwater infiltration systems for the proposed Tri-County Regional Vocational Technical High School project. The new school will be located to the east (rear) of the existing school. The site is located at 147 Pond Street in Franklin, Massachusetts. A Site Locus is provided as Figure 1. This report is subject to the attached limitations.

GENERAL INFORMATION

The project includes the new school building, the demolition of the existing school, a small garage to the east of the new school, renovated athletic fields, new parking lots and access roads, and a concession buildings for the new athletic fields.

The site presently contains, the existing school building (which will be demolished after the new school is built, asphalt paved parking lots (primarily in the southern and eastern portions of the Site), and paved access roads surrounding the existing school building. In addition, athletic fields are located to the northwest, and a solar field is located in the east portion of the Site. Smaller landscaped areas are located throughout the Site.

Project plans call for the construction of a new school building in the eastern portion of the Site (area of the existing solar field and east parking lot). The project will also include demolition of the existing building, construction of new parking lots and access roads to the west of the new building, and new landscaped areas and athletic fields.

We understand that the new school building will be a slab on grade structure with a first-floor slab at elevation 380, which is several feet above existing grade in the western portion

of the proposed building (area of the existing east parking lot) and close to existing grade in the eastern portion (existing solar field area).

The project will include five stormwater management systems to handle stormwater generated on the roof of the new building, on sidewalks and other impervious surfaces associated with the new school, and on paved parking areas and access roads. The approximate locations and footprints of these systems are shown on Figure 2. We understand that these systems will be designed to function as either infiltration or detention systems (or a combination of both) depending on soil and groundwater conditions.

This report addresses explorations performed within or near the three systems in the western part of the site (one located within existing athletic fields in the western part of the site, and two located near the footprint of the existing school building in the central part of the site. The remaining two stormwater management structures are located on the east and south sides of the new school building. Since these areas are within the limits of the existing solar field (which is currently active) they are not accessible at this time. The results of testing for the remaining two basins will be provided under separate cover.

SUBSURFACE EXPLORATIONS AND TESTING

Five backhoe test pits (designated TP-101 through TP-105) were performed in the area of proposed pavements in the western portion of the Site. These explorations were performed near locations selected by the project civil engineer. The locations were slightly adjusted to avoid damaging the existing pavements or underground utilities.

The test pits were performed on January 16, 2024 by Hersee Excavating of Stoughton, Massachusetts. Test pits were excavated using a John Deere 75G excavator equipped with a 0.5 cubic yard bucket.

Test pits TP-101 and TP-102 were performed adjacent to the system in the western part of the site and extended to a depth of 11 feet below the ground surface. Test pit TP-103 was performed in a landscaped area near the southern edge of the existing school building and encountered refusal upon bedrock between 1.5 and 5 feet below ground surface, corresponding to an elevation between 353.5 and 357. Test pit TP-104 was performed in the south-central part of the site near the bus lane for the existing school. Bedrock was present in test pit TP-104 at a depth of 6.5 feet, corresponding to an approximate elevation of 350. Test pit TP-105 was performed along an existing utility easement to the south of the existing school, where a new access road will likely be located. Bedrock was encountered at a depth of 3.5 feet at this location, near elevation 315.5. Approximate test pit locations are shown on the attached Site Plan (Figure 2).

An OTO geotechnical engineer logged the test pits and performed the hydraulic conductivity tests. The test pit logs are attached. Hydraulic conductivity (permeability) tests were performed immediately adjacent to three test pits, TP-101, TP-103 and TP-105. The results are discussed below.

SUBSURFACE CONDITIONS

Test Pits and Soil Conditions

Soil conditions in the test pits generally consisted of a surface layer of topsoil (approximately 8 to 14 inches thick), followed by sandy glacial till. The glacial till soils appeared to be dense to very dense and consisted of fine to medium sand with up to 30% coarse sand and gravel, and approximately 10% silt. The test pits either terminated at a depth of 11 feet (TP-101, -102) or encountered refusal upon granite bedrock in test pits TP-103, -104, -105. Numerous cobbles and boulders of varying sizes were observed in the test pits.

Groundwater/Estimated Seasonal High Groundwater

Water seepage was observed at 2.5 and 2 feet below the surface in TP-101 and TP-102, respectively. Soils below this seepage did not appear saturated; therefore, the seepage appears to consist of a water layer perched on the dense glacial till soils.

Saturated soils were encountered in test pit TP-102 at a depth of 8 feet below ground surface (approximate elevation 330.5). Redoximorphic features were observed in TP-102 between 8 to 9 feet and indicate an estimated high ground water depth at 8 feet. No other redoximorphic features or other signs of the estimated seasonal high groundwater table were observed in the test pits. Additional observations and notes are included in the attached test pit logs.

FIELD AND LABORATORY TESTING RESULTS

Field Hydraulic Conductivity Testing

In-Situ hydraulic conductivity (permeability) tests were performed within the glacial till soils observed just below the surface layer within test pits (TP-101, -103, and -105). These tests were performed to provide data for the design of the stormwater infiltration systems. The testing procedure and results are described below.

The hydraulic conductivity tests were performed with a Guelph permeameter using a constant head testing methodology. The Guelph permeameter allows the rate of water recharge into an unsaturated soil to be measured while a constant water head is maintained. Each test was performed by augering a shallow hole into the soil at the base of a test pit. The Guelph apparatus was then inserted, water was added to the apparatus. The change in the rate of water flow from the Guelph apparatus reservoir over time is recorded. These data are then used to measure the coefficient of permeability or hydraulic conductivity. At this site, little or no change in the water level in the reservoir was observed over several minutes, indicating relatively impermeable soils. This is likely a result of the density of the glacial till soils present at the Site.

Each test was performed within the unsaturated natural glacial till layer present at that depth. The hydraulic conductivity (K) values determined by these tests are presented in Table 1.

Table 1
Hydraulic Conductivity Test Results

Test Pit	Test Depth/Elev. (ft)	Soil Conditions	K Value (feet/day)
TP-101	2.0 / 341.0 4.0 / 339.0	Light brown to gray, fine to medium sand, little coarse sand, little gravel, trace silt	< 0.1
TP-103	2.0 / 356.5	Brown, fine to medium sand, some gravel, little coarse sand, trace (+) silt	< 0.1
TP-105	2.0 / 317.0	Light brown, fine to medium sand, some gravel, little coarse sand, trace (+) silt	< 0.1

Based upon these data the hydraulic conductivity within the glacial till appears to be less than 0.1 feet per day. No hydraulic conductivity tests were performed in the remaining test pits since soil conditions were similar and shallow perched water was present in test pit TP-102. We note that conditions in the remaining locations were similar not only in the remaining test pits but also in soil borings performed in other parts of the site. We note that no explorations have been performed to date in the area of the stormwater management systems to the east and south of the new school building.

SUMMARY AND CONCLUSIONS

Based on the very dense nature of near surface glacial till soils, the low hydraulic conductivity test results, the presence of shallow perched water and relatively shallow depth to bedrock, conditions are not favorable for stormwater infiltration.

We appreciated the opportunity to be of service on this project. If you have any questions, please contact the undersigned.

Sincerely yours,
O'Reilly, Talbot & Okun Associates, Inc.

Stephen McLaughlin, EIT
Senior Project Manager

Michael J. Talbot, P.E.
Principal

Pierre J. Carriere, EIT
Engineer I

Attachments: Limitations, Site Locus, Site Plan, Test Pit Logs & Photographs

LIMITATIONS

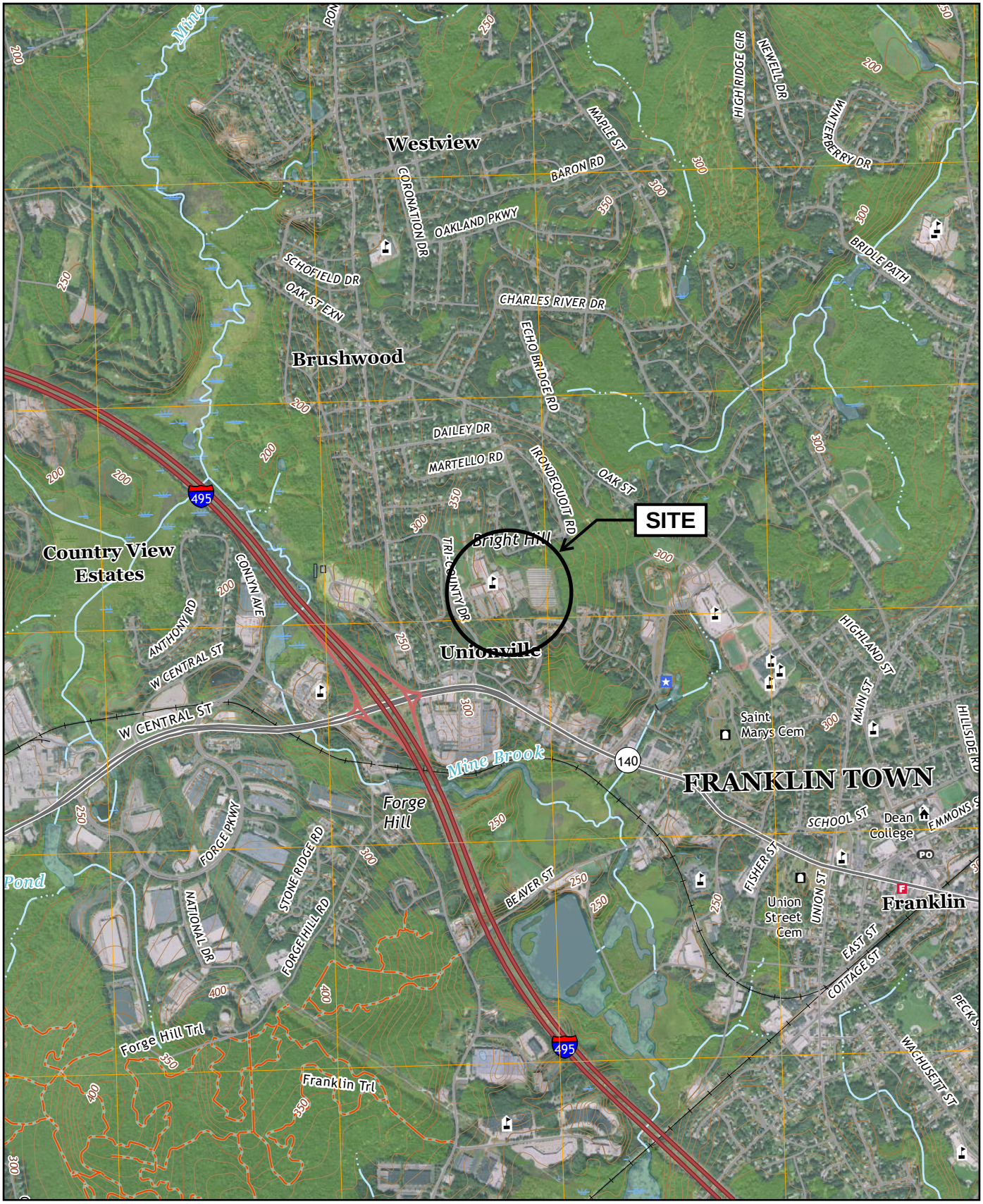
1. The observations presented in this report were made under the conditions described herein. The conclusions presented in this report were based solely upon the services described in the report and not on scientific tasks or procedures beyond the scope of the project or the time and budgetary constraints imposed by the client. The work described in this report was carried out in accordance with the Statement of Terms and Conditions attached to our proposal.

2. The analysis and recommendations submitted in this report are based in part upon the data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations of this report.

3. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

4. In the event that any changes in the nature, design or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by O'Reilly, Talbot & Okun Associates Inc. It is recommended that we be retained to provide a general review of final plans and specifications.

5. Our report was prepared for the exclusive benefit of our client. Reliance upon the report and its conclusions is not made to third parties or future property owners.



0 1000 FEET | 0 0.5 1.0 MILES | 0 0.5 1 KILOMETERS

1:24,000 SCALE NORTH AMERICAN VERTICAL DATUM OF 1988 10 FOOT CONTOUR INTERVAL

O:\J3400\3487 Tri-County Regional Vocational Technical High School, Franklin MA\06 Design Phase Geotech\Test Pits\OTO Tri-County Figure 1 - Site Locus (24k scale) Reduced.pdf

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES
293 Bridge Street, Suite 500 Springfield, MA 01103 413.788.6222
www.OTO-ENV.com

TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL

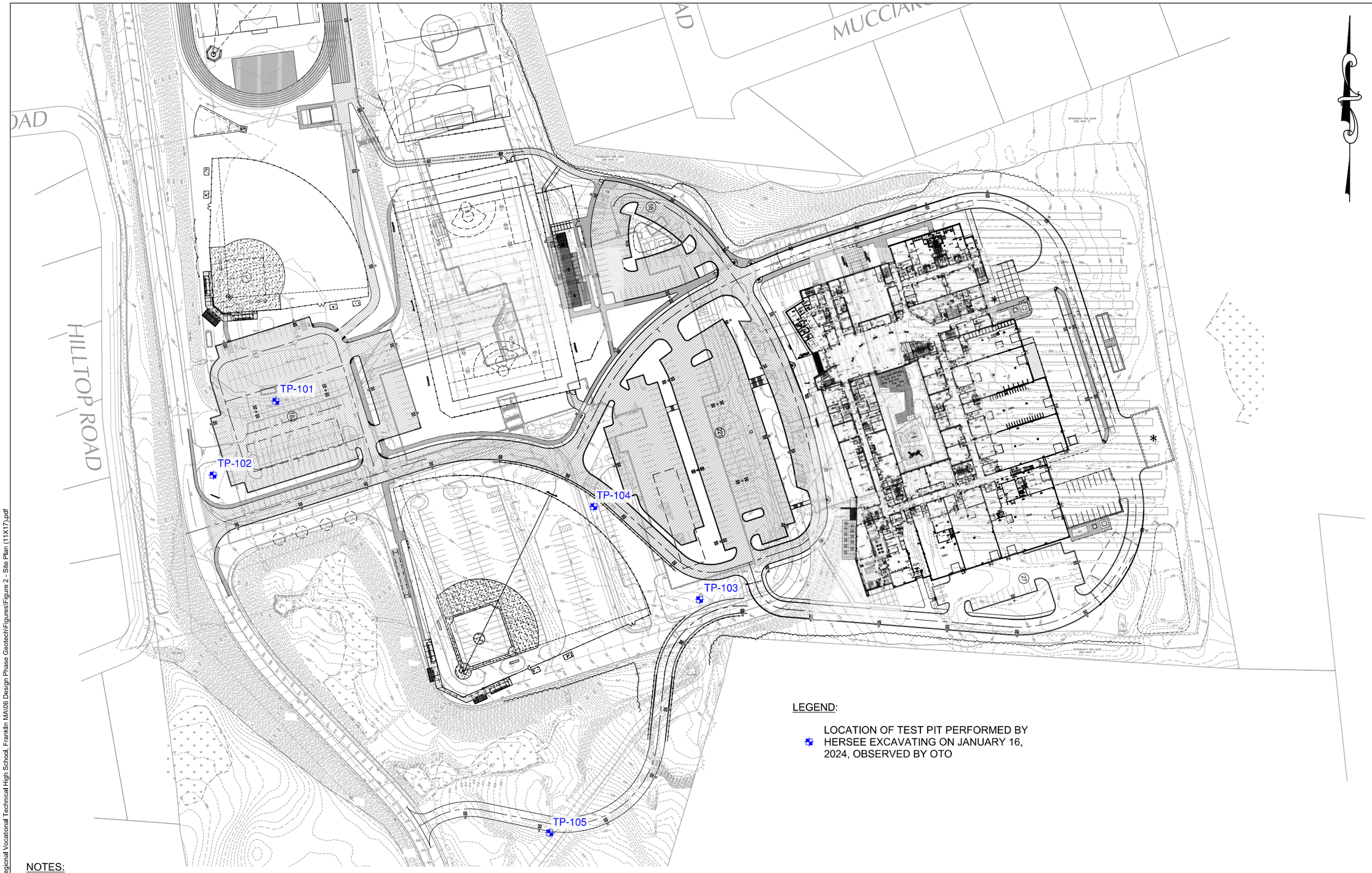
147 POND STREET
FRANKLIN, MASSACHUSETTS

SITE LOCUS

Topographic Map Quadrants: FRANKLIN, MA
Map Version: 2021
Current As Of: 2021
Date: FEBRUARY 2024

PROJECT No. J3487-01-06

FIGURE No. 1



LEGEND:

LOCATION OF TEST PIT PERFORMED BY HERSEE EXCAVATING ON JANUARY 16, 2024, OBSERVED BY OTO

NOTES:

1. BASE PLAN PROVIDED TO OTO IN ELECTRONIC FORMAT.
2. APPROXIMATE SAMPLE LOCATIONS ARE SHOWN ACCORDING TO TAPED MEASUREMENTS TAKEN FROM EXISTING SITE FEATURES OR MOBILE GPS APPLICATIONS
3. ALL DATA IS TO BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHODS USED IN THE DEVELOPMENT OF THIS PLAN

SCALE IN FEET
1" = 150'

0' 75' 150' 300'

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES
293 Bridge Street, Suite 500 Springfield, MA 01103 413.788.6222
www.OTO-ENV.com

DESIGNED BY: PJC
DRAWN BY: PJC
CHECKED BY: SMM
DATE: 02/02/2024
REV. DATE:

TRI-COUNTRY RVTHS TEST PITS

147 POND STREET
FRANKLIN, MASSACHUSETTS

SITE PLAN

PROJECT NO.
J3487-01-06

FIGURE NO.
2

O:\J3400\3487 Tri-County Regional Vocational Technical High School, Franklin MA\06 Design Phase Geotech\Figures\Figure 2 - Site Plan (11X17).pdf

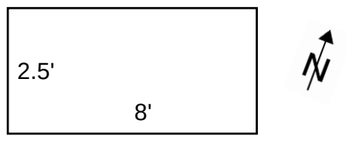
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-101

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	1/16/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Snow, 25°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	South of baseball field right field dugout	START TIME	08:10	CAPACITY (cy)	0.5
		FINISH TIME	08:50	GS ELEV. (ft)	343.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	11.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
1'	0.0'-1.2': Dark brown, fine to medium SAND and SILT, trace organics (roots), damp (TOPSOIL; SANDY LOAM)	E	0	--	--	--	
2'	1.2'-3.0': Light brown, fine to medium SAND, little coarse sand, little gravel, trace silt, damp (GLACIAL TILL; GRAVELLY LOAMY SAND)	D	2 8	S C	--	--	
							1.
3'	Perched water seepage at 2.5'						2.
4'	3.0'-11.0': Gray, fine to medium SAND, little coarse sand, little gravel, trace (+) silt, damp (GLACIAL TILL; GRAVELLY LOAMY SAND)	M	1 5 10	L S C	--	--	
5'							
6'							
7'							
8'							
9'							
10'							
11'							
	End of exploration at 11.0'						

TEST PIT PLAN



APPROXIMATE VOLUME = 8.1 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	No
GW Depth (ft):	>11'
GW Elevation (ft):	<332
Elapsed Time (min):	N/A

Remarks:

1. Hydraulic conductivity (permeability) test attempted at depths of 2' and 4', immediately adjacent to test pit and using a Guelph permeameter. No change in water level observed in permeameter.
2. Perched water seepage observed at 2.5' (elev 340.5). Depth to groundwater observed to be >11' (< 332).
3. No redoximorphic features or other signs of ESHGWT observed.

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-101

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-101

Test pit TP-101

Test pit TP-101 and topsoil spoils pile

TP-101 spoils pile

Remarks:	PROJECT NO. 3487-01-06
	LOG OF TEST PIT TP-101

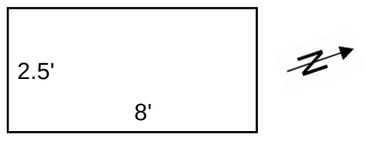
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-102

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	1/16/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Snow, 25°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Near west entrance to front parking lot from Tri-County Drive	START TIME	09:05	CAPACITY (cy)	0.5
		FINISH TIME	09:40	GS ELEV. (ft)	338.5
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	11.0

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
1'	0.0'-1.0': Very dark brown to dark brown, SILT and fine to medium SAND, trace organics (roots), damp (TOPSOIL; LOAM)	E	0	--	--	--	
2'	1.0'-11.0': Gray, fine to medium SAND, little coarse sand, little gravel, trace (+) silt, damp (GLACIAL TILL; GRAVELLY LOAMY SAND)	M	10	C	--	--	
	Perched water seepage at 2.0'						1.
8'	Wet soils encountered at 8.0'						2., 3.
	20% rust mottling (5 YR 5/8) from 8.0' to 9.0'						
11'	End of exploration at 11.0'						

TEST PIT PLAN



APPROXIMATE VOLUME = 8.1 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	Yes
GW Depth (ft):	8.0
GW Elevation (ft):	330.5
Elapsed Time (min):	N/A

Remarks:

1. Perched water seepage observed at 2.0' (elev 336.5).
2. Groundwater (wet soils) encountered at 8.0' (elev 330.5).
3. Redoximorphic features (20% rust mottling) observed between 8.0' to 9.0'. Estimate high groundwater at 8'. No other redoximorphic features or other signs of ESHGWT observed.

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-102

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-102

Test pit TP-102

TP-102 spoils pile

Remarks:	PROJECT NO. 3487-01-06
	LOG OF TEST PIT TP-102

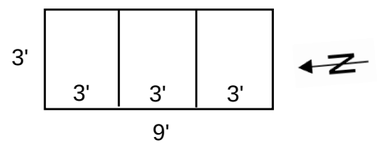
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-103

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	1/16/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Heavy snow, 27°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Grass area immediately south of existing school building	START TIME	09:55	CAPACITY (cy)	0.5
		FINISH TIME	10:15	GS ELEV. (ft)	358.5
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	5.0

DEPTH (ft)	N S SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
	0.0'-0.7': Very dark brown to brown, fine to medium SAND, some silt, trace coarse sand, trace organics (roots), damp (TOPSOIL; SANDY LOAM)	E	0	--	--	--	
1'	0.7'-5.0': Brown, fine to medium SAND, some gravel, little coarse sand, trace (+) silt, damp (GLACIAL TILL; GRAVELLY LOAMY SAND)	D	3 1 3 8	L M S C	--	--	2.
2'	Bedrock (granite)						
3'							
4'							
5'	Refusal encountered between 1.5' and 5.0' upon bedrock						
6'							
7'							
8'							
9'							
10'							
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 2.8 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	No
GW Depth (ft):	N/E
GW Elevation (ft):	N/E
Elapsed Time (min):	N/A

Remarks:

1. Hydraulic conductivity (permeability) test attempted at depth of 2', immediately adjacent to south end of test pit and using a Guelph permeameter. No change in water level observed in permeameter.
2. No groundwater or wet/moist soils encountered.
3. No redoximorphic features or other signs of ESHGWT observed. Groundwater observed to be greater than maximum depth explored

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-103

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-103

Test pit TP-103

Test pit TP-103

TP-103 spoils pile

Granite bedrock in TP-103

Remarks:	**PROJECT NO.** **3487-01-06**
	LOG OF TEST PIT **TP-103**

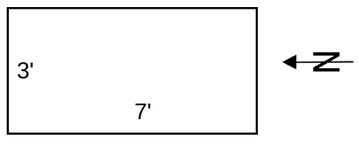
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-104

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	1/16/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Heavy snow, 27°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Grass area along sidewalk adjacent to existing bus lane	START TIME	10:15	CAPACITY (cy)	0.5
		FINISH TIME	10:45	GS ELEV. (ft)	357.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	6.5

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
1'	0.0'-1.0': Very dark brown to dark brown, fine to medium SAND, some silt, little to trace organics (roots, tree roots), trace coarse sand, damp (TOPSOIL; SANDY LOAM)	E	0	--	--	--	
2'	1.0'-6.5': Brown to light brown, fine to medium SAND, little coarse sand, little gravel, trace silt, damp (GLACIAL TILL; GRAVELLY LOAMY SAND)	M	1 2 5	L M C	--	--	
3'							
4'							
5'							
6'	Refusal encountered at 6.5' upon bedrock						
7'							
8'							
9'							
10'							
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 5.1 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	No
GW Depth (ft):	N/E
GW Elevation (ft):	N/E
Elapsed Time (min):	N/A

Remarks:
1. No groundwater or wet/moist soils encountered.
2. No redoximorphic features or other signs of ESHGWT observed. Groundwater observed to be greater than maximum depth explored

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-104

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-104

Test pit TP-104

TP-104 spoils pile

TP-104 side wall

Remarks:	PROJECT NO. 3487-01-06
	LOG OF TEST PIT TP-104

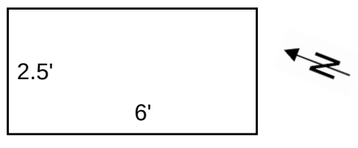
O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

LOG OF TEST PIT TP-105

PROJECT	Tri-County Regional Vocational Technical High School			CONTRACTOR	Hersee Excavating
JOB NO.	3487-01-06	DATE	1/16/2024	OPERATOR	Scott Hersee
LOCATION	Franklin, MA	WEATHER	Snow, 28°F	BACKHOE	John Deere 75G
TEST PIT LOCATION	Southern portion of site, along utility access road	START TIME	10:50	CAPACITY (cy)	0.5
		FINISH TIME	11:15	GS ELEV. (ft)	319.0
		OTO STAFF	Pierre Carriere	FINAL DEPTH (ft)	3.5

DEPTH (ft)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDERS/ COBBLES COUNT	BOULDERS/ COBBLES CLASS	SAMPLE NO.	FIELD TEST DATA	REMARKS
1'	0.0'-3.5': Light brown, fine to medium SAND, some gravel, little coarse sand, trace (+) silt, damp (GLACIAL TILL (GRAVELLY LOAMY SAND) (Little to trace organics (roots, tree roots) in top 12"; trace debris (brick) near surface)	M	1 2 5 15	L M S C	--	--	
2'							
3'							
4'	Refusal encountered at 3.5' upon bedrock						
5'							
6'							
7'							
8'							
9'							
10'							
11'							

TEST PIT PLAN



APPROXIMATE VOLUME = 1.9 cy

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Very Difficult	V

BOULDER/COBBLE CLASS

Type	Size	Abbr.
Cobble	3" - 6"	C
Small	6" - 18"	S
Medium	18" - 36"	M
Large	36" and Larger	L

PROPORTIONS USED

Term	Relative Quantity
and	35% - 50%
some	20% - 35%
little	10% - 20%
trace	10% or less

GROUNDWATER CONDITIONS

GW Encountered?:	No
GW Depth (ft):	N/E
GW Elevation (ft):	N/E
Elapsed Time (min):	N/A

Remarks:

1. Hydraulic conductivity (permeability) test attempted at depth of 2', immediately adjacent to test pit and using a Guelph permeameter. No change in water level observed in permeameter.
2. No groundwater or wet/moist soils encountered.
3. No redoximorphic features or other signs of ESHGWT observed. Groundwater observed to be greater than maximum depth explored

PROJECT NO.

3487-01-06

LOG OF TEST PIT

TP-105

O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

TEST PIT PHOTOGRAPHS TP-105

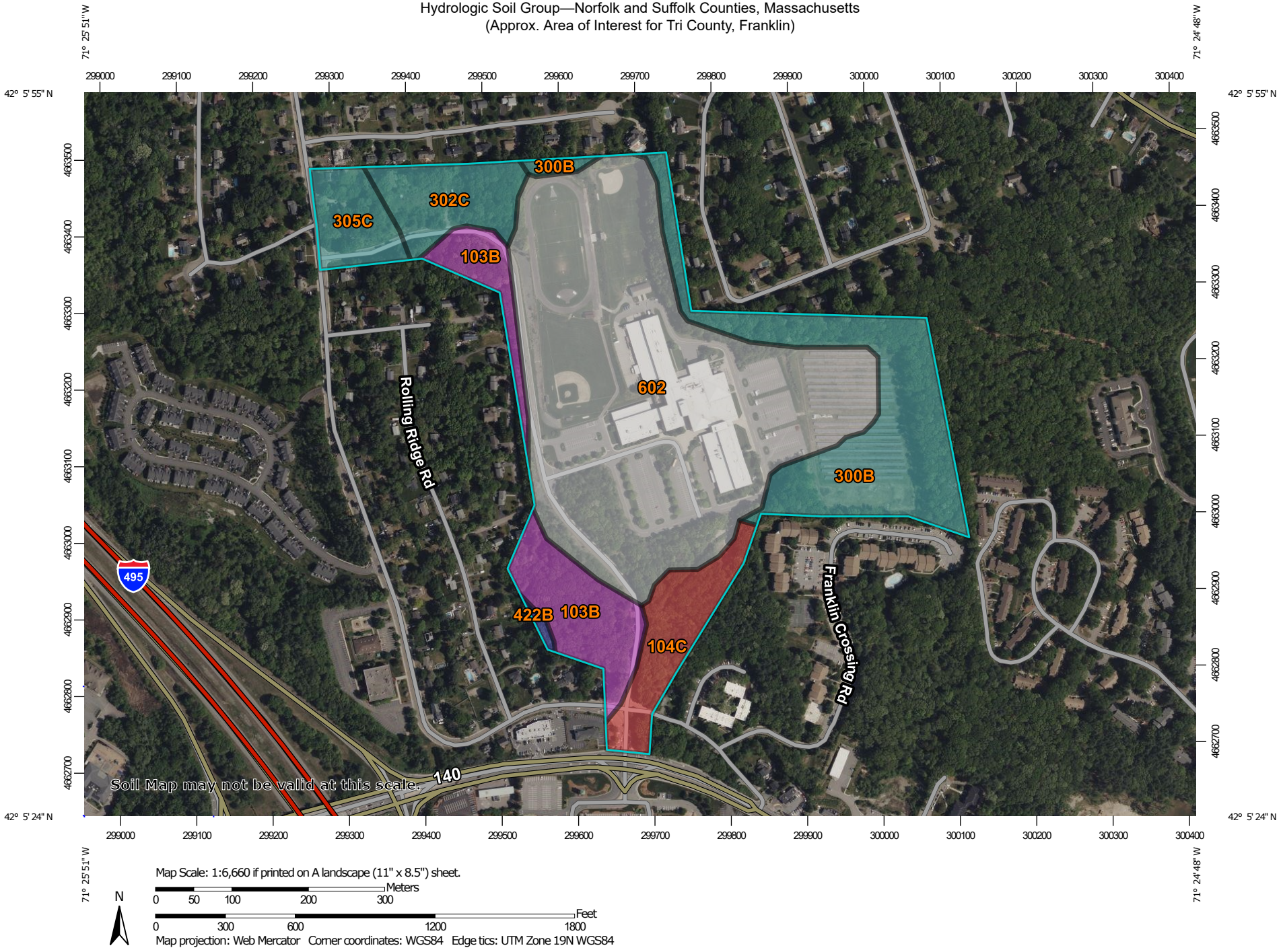
Test pit TP-105

TP-105 spoils pile

Granite boulder from TP-105

Remarks:	PROJECT NO. 3487-01-06
	LOG OF TEST PIT TP-105

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(Approx. Area of Interest for Tri County, Franklin)



Map Scale: 1:6,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 19, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	7.3	10.3%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	4.6	6.4%
300B	Montauk fine sandy loam, 3 to 8 percent slopes	C	12.9	18.2%
302C	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	C	4.3	6.0%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	3.1	4.3%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	0.2	0.3%
602	Urban land, 0 to 15 percent slopes		38.8	54.5%
Totals for Area of Interest			**71.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX 5:
SKETCHES/MAPS

LEGEND:

TC PATH

TC PATH
(PIPE CHANNEL)

NRCS SOIL
CLASSIFICATION

NRCS SOIL CLASSIFICATION SOIL CLASS = UNRATED

NRCS SOIL CLASSIFICATION SOIL CLASS = A

NRCS SOIL CLASSIFICATION SOIL CLASS = C

NRCS SOIL CLASSIFICATION SOIL CLASS = D

70 35 0 70 140

1 inch = 70 feet

DRA

Drummey Rosane Anderson, Inc.

260 Charles Street
Studio 300
Waltham, MA
02453

225 Oakland Road
Studio 205
South Windsor, CT
06074

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www.draws.com

Tri-County Regional Vocational Technical High School

147 Pond St, Franklin, MA 02038

COMMONWEALTH OF MASSACHUSETTS
STEPHEN J. POWERS
CIVIL
NO. 45896
REGISTERED PROFESSIONAL ENGINEER

NOTICE OF INTENT

06/27/2024

KEY PLAN

PROJECT NORTH

MAGNETIC NORTH

EXISTING WATERHSED MAP

Scale:
Project: 52033.00
Author:
Date: 03/18/2024

LEGEND:

TC PATH

TC PATH
(PIPE CHANNEL)

NRCS SOIL
CLASSIFICATION

NRCS SOIL CLASSIFICATION SOIL CLASS = UNRATED

NRCS SOIL CLASSIFICATION SOIL CLASS = A

NRCS SOIL CLASSIFICATION SOIL CLASS = C

NRCS SOIL CLASSIFICATION SOIL CLASS = D

POND STREET

HILLTOP ROAD

MACARTHUR ROAD

MUCCIARONE ROAD

OLD WEST CENTRAL STREET

POA-1 POA-2 POA-3 POA-4 POA-5 POA-6 POA-7 POA-8

PWS-1 PWS-2 PWS-3 PWS-4 PWS-5 PWS-6 PWS-7 PWS-8 PWS-9 PWS-10 PWS-11 PWS-12 PWS-13 PWS-14 PWS-15 PWS-16 PWS-17

PROPOSED E1-07-CB
RIM=307.75
INV.(OUT)=299.75

70 35 0 70 140

1 inch = 70 feet

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REGISTERED PROFESSIONAL ENGINEER

NOTICE OF INTENT

06/27/2024

KEY PLAN

A B C D E

PROJECT NORTH

MAGNETIC NORTH

PROPOSED
WATERHSED MAP

Scale:
Project: 52033.00
Author:
Date: 03/18/2024

APPENDIX 6:
OPERATION AND MAINTENANCE PLAN

TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL
147 POND ST
FRANKLIN, MA 02038

OPERATION & MAINTENANCE PLAN

Pursuant to M.G.L c. 131 §40
& Franklin Wetland Protection Bylaws Chapter 181

Submitted to:
Town of Franklin Conservation Commission
Massachusetts Department of Environmental Protection

Prepared for:
Harry Takesian, Tri County Director of Facilities Management
Tri-county Regional Vocational Technical High School
147 Pond St
Franklin, MA 02038

Owner:
Tri-county Regional Vocational Technical High School
147 Pond St
Franklin, MA 02038

Owner Representative:
Karen McGuire, Tri County Reg. Voc. Tech. HS Super Intendent
Tri-county Regional Vocational Technical High School
147 Pond St
Franklin, MA 02038

Signature

Date

June, 2024

Town of Franklin – Tri-County Regional Technical High School
OPERATION AND MAINTENANCE PLAN
June 2024

During Construction the General Contractor shall be responsible for the following:

1. Erosion Control

Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work and surrounding temporary soil stockpiles as needed, and in any sensitive areas as work progresses. Filter socks/Silt fence shall be inspected for depth of sediment, tears, to check that the fabric is securely fastened to the fence posts, and to inspect that the fence posts are firmly set in the ground.

Erosion control shall be left in place until directed by the Conservation Commission to remove it.

2. Site Access

Site access for construction equipment will be from the multiple access points at the construction entrances as indicated on the. See E&SC plan.

3. Construction Staging

A construction staging area will be established on the existing woodlands within the site. All construction materials, supplies, trailers and offices, portable toilets, and equipment shall be stored within the limits of the staging area. Temporary trailers and offices may also be located within the developed portion of the site. All temporary stockpiles will be surrounded with straw wattles and silt fencing as required to prevent erosion damages.

4. Site Grading/Site Work

The site grading related site activities may only commence when the site is stable from erosion and all required control measures are in place and functional. Site work during wet periods should be avoided if possible and limited to only those areas that will not have adverse impacts on wetland resource areas.

5. Slope Stabilization

All surfaces and slopes shall be checked after each major storm event and at *least once every 7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of a storm event 0.25 inches or greater* to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the General Contractor shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately or stabilized in a manner acceptable to the Conservation Commission if it is outside of the growing season. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation. If stabilization is required during the non-growing season, straw mulch, or a commercially manufactured blanket must be employed to prevent erosion.

6. Permanent Stabilization

Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 5 days after the last construction activity. Stabilization shall be done by hydroseeding all graded and exposed areas as soon as possible. If hydroseeding is performed during non-growing season then newly hydroseeded areas shall be covered with a thick layer of straw. Newly seeded areas shall be inspected on a monthly basis and the hay replaced, as required, until the vegetation is well established.

7. Dust and Sediment Control

Catch Basin Filter (silt sacks):

Catch basin / area drain filters (silt sacks) shall be placed at all inlets to drainage structures as structures are installed and prior to pavement removal. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings.

Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.

Compost filter sock and silt fence:

Compost filter sock and silt fence shall be installed as indicated on the Drawings. Sock shall be placed in a row with ends tightly abutting the adjacent sock. Each sock shall be securely anchored in place by 2 stakes or re-bars driven through the sock. The first stake in each sock shall be angled toward the previously laid wattle to force the socks together.

Construction Entrance:

The areas of the construction entrance should be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans. See E&SC plan for multiple construction entrances.

The Construction Entrance shall be a minimum of 50-feet in length and 20-feet wide.

Temporary Sediment Basins:

Basins shall be provided, if necessary, by the contractor designed to provide storage for either the calculated volume of runoff from a 2-year, 24-hour storm, or 3,600 cubic feet per acre drained. Erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets are required. The contractor shall remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition

Dust Control:

The Contractor shall employ dust control methods and materials at all times using sprinkled water or other approved means. A mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

Implement and maintain stabilization measures (e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydro mulch, gravel) that minimize erosion from exposed portions of the site. Initiate the installation of stabilization measures immediately28 in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days; and complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization has been initiated.

Diversion Swales:

A diversion swale shall be utilized in the interim phase to convey water away from the proposed building.

Check Dams:

Stone check dams shall be utilized within the diversion swales to reduce runoff velocity and erosion while allowing sediments to settle.

Stockpiles:

Locate the piles outside of any natural buffers and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated; Install a sediment barrier along all downgradient perimeter areas; For piles that will be unused for 14 or more days, provide cover or appropriate temporary stabilization You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S.

Dewatering Practices

Dewatering shall be used to prevent damages, reduce erosion, and control runoff. If necessary, the discharge water generated by the construction dewatering will be directed to a temporary detention basin, or settling basin as permitted by state regulation. The pumping discharge shall not be allowed to enter directly into wetlands. The water from the work areas shall be pumped to a temporary sedimentation and dewatering basin. Approximately 70 percent sedimentation trapping efficiency shall be achieved in sizing the basins to ensure that the basins are adequate to prevent overtopping from dewatering and to provide the required filtering. The outlet from the basin shall be located so as to not cause erosion of the surrounding area. Locations of the temporary sedimentation and dewatering basins are to be selected by the Contractor subject to approval from the Design Engineer/Landscape Architect. At the conclusion of dewatering activities, any and all well casings and equipment will be removed from the site.

If a sediment basin or similar impoundment is installed:
Situate the basin or impoundment outside of any water of the U.S. and any natural buffers
Design the basin or impoundment to provide storage for either:
i. The calculated volume of runoff from a 2-year, 24-hour storm; or ii. 3,600 cubic feet per acre drained.
Calculation are to be provided to Civil Engineer prior to commencement of site construction based on contractor's means and methods plan.

Pollution Prevention Measures

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the siltation of the wetland areas down-gradient of the site. Wattles, crushed stone, siltation fencing, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g., wattles and other control materials) shall be stored on site for emergencies.

2. Casting of excavated materials shall be stored away from wetland areas and sensitive land areas.

3. Any stockpiling of loose materials shall be properly stabilized to prevent erosion and siltation. Preventative controls such as hay bales, temporary seeding/mulching and jute covering shall be implemented to prevent such an occurrence.

4. There shall be no flooding, ponding, or flood related damage caused by the project or surface run-off emanating from the project on lands of an abutter, nearby or down-gradient of the site.

5. There shall be no contaminant migration caused by the project to nearby and down-gradient properties, nearby aquifers, and nearby resource areas.

6. The Site Operator shall make sufficient provisions to control any unexpected drainage and erosion conditions that may arise during construction that may create damage on abutting properties. Said control measures are to be implemented at once.

7. During construction flood prevention, erosion, and sedimentation controls shall be in place before the natural ground cover is disturbed. Said controls shall be in place prior to other construction work and shall be monitored and approved by the Site Operator. They shall be properly maintained and are not to be removed until the site is stabilized.

8. The Site Operator shall designate a person or persons to inspect and supervise the drainage and erosion controls for the project. The Conservation Commission shall be notified as to the means to contact said individual or individuals on a 24-hour basis on all working and non-working days of the project. Said means of contact shall include at least 2 separate telephone number of said designated person or persons.

9. There shall be periodic inspection of wattles, and other erosion controls by the Operator's Designee to assure their continued effectiveness.

10. Street sweeping shall be used to keep public ways free and clear of sediment and dirt from the site activities.

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

Hazardous Waste. No Hazardous materials are expected to be encountered. The mandated State and Local permits for removal of such materials, if located, will be implemented when such materials are encountered.

After Construction the Owner shall be responsible for the following:

General Land Grading and Slopes Stabilization

All surfaces and slopes shall be checked bi-annually to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the Owner shall be repaired promptly.

Areas requiring re-vegetation shall be replanted immediately. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation.

Areas of steep slopes (2.5:1 or greater) shall be stabilized using jute mesh or a similar approved erosion blanket.

Erosion Controls

Erosion controls shall not be removed or dismantled without approval from the Engineer or Conservation Commission. Sediment deposits that are removed or left in place after the barriers have been dismantled shall be graded manually to conform to the existing topography and vegetated using seeding or other long term cover as approved in the Landscape Plan. Bare ground that cannot be permanently stabilized within 30 days shall be stabilized by temporary measures.

Street Sweeping

It is proposed that the parking and drive areas be swept with a wet brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Housekeeping

Trash is picked up around the grounds daily as needed, internal trash is managed and emptied daily, all trash is stored in on-site containers currently hauled as needed by BP Trucking.

Vehicle Washing

Washing of cars in the Auto shop is minimal and run off is captured by the center trough floor drain which is picked up by the building plumbing system.

Spill Prevention

Waste oil is minimal and stored in an on-site storage container which is emptied as needed by a certified HazMat contractor.

Storage

Tank is stored within an overpack containment unit sized for the 275 gallon tank the waste oil is stored. In the event of an overflow/spill HazMat company would be dispatched to assist.

Fertilizers, Herbicides, and pesticides

We do use pesticide and herbicide on occasion for weed and pest control although we do try to use non toxic formulas whenever possible. They are stored in the Maintenance garage.

Pet Waste Management

Pet waste management does not apply to us.

Headwall and swales

The Facilities Department can handle inspections and maintenance of the swale and headwalls. Frequency of mowing varies depending on the area and its use but on average weekly/bi-weekly. Game field mowing would be more frequent and likely weekly.

Stormwater Management System

Catch Basins, Area Drains, and Drain Manholes ($500 per structure per inspection/cleaning):

The catch basins, drain manholes, roof drains, and area drains shall be inspected quarterly, and cleaned out when sumps are approximately one foot full. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Water Quality Unit (WQU) ($1,000 per structure per inspection/cleaning):

Water Quality Unit shall be as follows and per manufacturer's recommendations:

- Units should be inspected and cleaned/emptied post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity (generally taking one year or longer).
- Inspect the unit immediately after an oil, fuel, or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical, or fuel spills and dispose responsibly.
- Owner to follow the requirements of the manufacturer for maintenance and cleaning of the units with a frequency as noted above, and where the requirements of this Operations and Maintenance Plan are more rigorous than manufacturer's requirements, defer to this Operations and Maintenance Plan.

Infiltration and Detention Systems ($2,500 per system cleaning; $350 per system per inspection):

The infiltration systems' inlets and outlets should be inspected twice a year, in spring and fall. Any clogs, debris, or sedimentation should be cleared as required to ensure the inlets and outlets are flowing freely.

The infiltration chambers and inlet and outlet connections should be inspected every 12 months and quarterly for the first year of operation.

Any clogs, sediment, or debris encountered within the infiltration system should be removed using a vacuum truck. The integrity and functionality of the chambers, pipes, and inspection ports should also be checked at the time of the cleaning.

BMP Accessories: Level Spreaders, Outlet Structures, Catch Basin Inserts

Level Spreaders: Inspect level spreaders regularly, especially after large rainfall events. Note and repair any erosion or low spots in the spreader.

Outlet Structure: The preferred approach is to end the outlet pipe at a headwall or flared-end structure with a riprap or bio-engineered splash pad, discharging to a manmade drainage swale that is aligned at no more than a 45-degree angle to a stream channel. Design the outlet point and riprap or bio-engineered splash pad to reduce the energy sufficiently to eliminate a need to install riprap on the bank opposite the outfall point to protect it from scour.

Catch Basin Inserts: Inspect Catch Basin Inserts per the manufacturer's schedule, and especially after large rainfall events. Whoever is responsible for maintenance should explicitly agree to conduct the maintenance per the manufacturer's recommendation and to lawfully dispose of the cleanings or used filtration media.

Snow Storage

Snow shall be stored within snow storage locations on the site. See plan C-1.0 for more detail.

De-Icing Chemicals

De-icing of the vehicular parking areas is done by a sub-contractor who uses typical sand and salt mixture.

Grass Swale

The grass swale shall be inspected the first few months after construction to make sure that there is no rilling or gullying, and that vegetation in the channel is adequate. Thereafter, inspect the channel twice a year for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation. Regular maintenance tasks include mowing, fertilizing, liming, watering, pruning, weeding, and pest control. Mow channels at least twice per year. Do not cut the grass shorter than three to four inches. Keep grass height under 6 inches to maintain the design depth necessary to serve as a conveyance. Do not mow excessively, because it may increase the design flow velocity. Remove sediment and debris manually at least once per year. Re-seed periodically to maintain the dense growth of grass vegetation. Take care to protect drainage channels from snow removal procedures and off-street parking.

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Tri-County Regional Technical High School - Franklin, MA
147 Pond Street, Franklin, MA
INSPECTOR:_____DATE:_____
Regular Inspection: ☐
Inspection after Rainfall: ☐ Amount of Rainfall:____inches

BMP	Functioning Correctly	Notes/Action Taken
Water Quality Unit	Y/N	
Outlet Control Structure	Y/N	
Catch Basin	Y/N	
Double Catch Basin	Y/N	
Drainage Manhole	Y/N	
Infiltration system	Y/N	
Detention system	Y/N	
Flared End Section	Y/N	
Area Drain	Y/N	
Grass Swales	Y/N	
Headwalls	Y/N	

Additional Observations: _____

_____

_____

Action Required: _____

_____

_____

To be performed by:_____On or Before:_____

April 2019

STORMTRAP MAINTENANCE MANUAL

1. Introduction

As with any Stormwater system regular inspections are recommended to ensure the long-term function of the system per design. As Stormwater migrates through the system, both sediment and debris could collect or settle within the system invert. Such events would prompt a regular inspection and or maintenance plan. Please call your Authorized StormTrap Representative (877-867-6872) if you have questions regarding the inspection and/or maintenance of the StormTrap system(s). Prior to entry into any underground storm sewer or underground detention systems, appropriate OSHA and local safety regulations and guidelines should be followed.

2. Inspection Schedules

StormTrap Stormwater Management Systems are recommended for inspection whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected and/or maintained. This will economize the cost of the inspection if it is done at the same time the municipal crews are servicing the area.

During the first year of service, StormTrap recommends an accelerated inspection schedule to establish baseline levels of debris and/or sediment within the system. Inspections should be made after each significant rain event or runoff period. We also recommend a quarterly inspection in addition to the event-based inspections for the first 12 months. Based upon the results of the first year of inspections, a more appropriate schedule can be generated.

StormTrap Stormwater Management Systems for a private development are recommended for inspection after construction activities are complete and system is functioning per design and after each major storm water event. Until a cleaning schedule can be established, a quarterly inspection is recommended for the first 12 months. After the first 12 months, a

regular schedule can be implemented. If inspected on a biannual basis, the inspection should be conducted before the stormwater season begins to be sure that everything is functioning properly for the upcoming storm season. If inspected on an annual basis, the inspection should be conducted before the stormwater season begins to be sure that everything is functioning properly for the upcoming storm season.

3. Inspection Process

Inspections should be done such that at least 2-3 days has lapsed since the most recent rain event to allow for complete draining. Visually inspect the system at all manhole locations. Utilizing a sediment pole, measure and document the amount of silt at each manhole location (Figure 1). Inspect each pipe opening to ensure that the silt level or any foreign objects are not blocking the pipes. Be sure to inspect the outlet pipe(s) because this is typically the smallest pipe in the system. It is common that most of the larger materials will be collected upstream of the system in catch basins, and it is therefore important at time of inspections to check these structures for large trash or blockages.

Remove any blockages if you can during the inspection process only if you can do so safely from the top of the system without entering into the system**. Do not go into the system under any circumstances** without proper ventilation equipment and confined space training. Pass any information requiring action onto the appropriate maintenance personnel if you cannot remove the blockages from above during the inspection process. Be sure to describe the location of each manhole and the type of material that needs to be removed.

The sediment level of the system should also be measured and recorded during the inspection process. Recording the sediment level at each manhole is very important in order get a history of sediment that can be graphed over time (i.e. years) in order to estimate when the system will need to be maintained next. It is also important to keep these records to verify that the inspection process was actually performed if anyone asks for your records in the future. ***(Please see Appendix A for reference)***

The sediment level in the underground detention system can be determined from the outside of the system by opening up all the manholes and using a sediment pole to measure the

amount of sediment at each location. Force the stick to the bottom of the system and then remove it and measure the amount of sediment at that location. Again, do not enter into the system under any circumstances without proper ventilation equipment and training. Please see Appendix A for a sample inspection document.

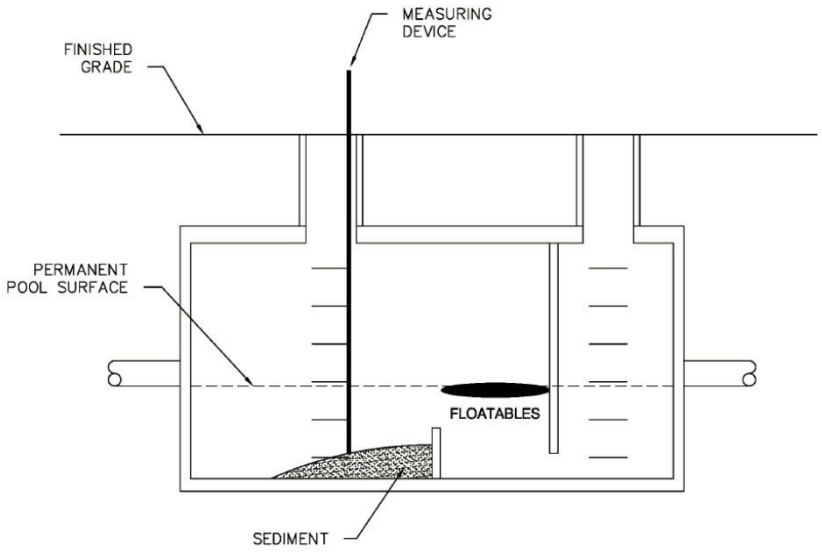


Figure 1. During inspection, measure the distance from finished grade to the top of the sediment inside the system.

4. When to Clean the System

Any blockages should be safely removed as soon as it is safely possible to ensure the StormTrap detention system will fill and drain properly before the next stormwater event.

The dry detention system should be completely cleaned whenever the sediment occupies more than 10% to 15% of the originally designed system's volume. A wet system (sometimes referred to as a wet vault) should be cleaned when the sediment occupies more than 30% or 1/3rd of the originally designed system's volume.

NOTE: Check with your municipality to ensure compliance with local guidelines regarding cleaning criteria, as the allowable sediment before cleaning may different that StormTrap's recommended ranges.

5. How to Clean the StormTrap

StormTrap systems should be completely cleaned back to 100% of the originally designed storage volume whenever the above sediment levels have been reached. Be sure to wait at least 3 days after a stormwater event to be sure that the system is completely drained (if it is a dry detention system), and all the sediments have settled to the bottom of the system (if it is a wet detention system).

There are many maintenance companies that can be contracted to clean your underground stormwater detention systems and water quality units. Please call your StormTrap representative for referrals in your area.

Product Specific Maintenance Recommendations

A. SingleTrap on a Concrete Slab

Maintenance is typically performed using a vacuum truck or jet-vac system. If headroom allows, sediment can be manually gathered near access openings and removed with suction. Shorter systems will require a mobile jet vac system that operates throughout the system to collect and remove sediment.

Sediment should be flushed towards a vacuum hose for thorough removal. For a dry system, remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. If present, open the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

If the system was designed to maintain a permanent pool of water, floatables and any oil should be removed in a separate procedure prior to the removal of all sediment.

The floatable trash is removed first by using a bucket strainer to capture and remove any floating debris.

The floatable oils are then removed off the top of the water by using the vacuum truck to suck off any floatable fluids and liquids.

The next step is to use the vacuum truck to gently remove the clarified water above the sediment layer.

The final step is to clean the sediment for each row as described above. For smaller systems, the vacuum truck can remove all the sediment in the basin without using the sewer jetting equipment because of the smaller space.

B. SingleTrap on Stone

SingleTrap systems on a stone base require a similar cleaning process as a SingleTrap on a concrete slab. However, extra care needs to be taken to make sure the stone base retains levelness. If system headroom allows, manual raking of sediment a debris can be performed. Shorter systems may require jet vac equipment. Adjusting the pressure setting on the jet vac to ensure the stability of the stone base.

Sediment should be flushed towards a vacuum hose for thorough removal. Remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. Access the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

C. DoubleTrap

A DoubleTrap system can be maintained in a similar fashion as a SingleTrap on a concrete slab. Typically, headroom is greater in DoubleTrap systems and access is easier for manual

gathering of sediment and debris. Again, maintenance is typically performed using a vacuum truck or jet-vac system. Sediment can be gathered near access openings and removed with suction. Alternately, a jet vac system that operates throughout the system can be used to remove sediment.

Sediment should be flushed towards a vacuum hose for thorough removal. For a dry system, remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. If present, open the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

If the system was designed to maintain a permanent pool of water, floatables and any oil should be removed in a separate procedure prior to the removal of all sediment.

The floatable trash is removed first by using a bucket strainer to capture and remove any floating debris.

The floatable oils are then removed off the top of the water by using the vacuum truck to suck off any floatable fluids and liquids.

The next step is to use the vacuum truck to gently remove the clarified water above the sediment layer.

The final step is to clean the sediment for each row as described above. For smaller systems, the vacuum truck can remove all the sediment in the basin without using the sewer jetting equipment because of the smaller space.

D. ShallowTrap

A ShallowTrap system can be cleaned in a similar fashion as a Single Trap on a stone base. The headroom limitation will not allow for manual entry removal of sediment. Precautions will need to be taken to ensure the stone base retains levelness. Using a jet vac system to flush out the sediment is the recommended method.

Sediment should be flushed towards a vacuum hose for thorough removal. Remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the ShallowTrap system. Access the manhole at the opposite end of the ShallowTrap and use sewer jetting equipment to force water in the same row from one end of the ShallowTrap row to the opposite side. The rows of the ShallowTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

E. SiteSaver

Site Savers have 3 potential components that require maintenance and cleaning. Depending on the specifications of the system, trash nets, oil mats, and sediment removal will all need to be addressed.

Inspections should be done such that a enough time has lapsed since the most recent rain event to allow for a static water condition. Visually inspect the system at all manhole and access opening locations. For debris accumulation, visually inspect the netting or screening basket components (if utilized) to determine the bag or basket capacity. Nets or baskets containing only minor quantities of debris may be retained in place. It is recommended to replace the nets or clean the screening baskets when they appear 1/2 - 2/3 full. Failure to replace nets and/or remove floatables from bypass screening (if applicable) will lead to hydraulic relief, drain down deficiencies, and decrease the long-term functionality of the system.

For sediment accumulation, utilize either a sludge sampler or a sediment pole to measure and document the amount of sediment accumulation. To determine the amount of sediment in the system with a sludge sampler follow the manufacturer's instructions. If utilizing a sediment pole, first insert the pole to the top of the sediment layer and record the depth. Then, insert the pole to the bottom of the system and record the depth. The difference in the two measurements corresponds to the amount of sediment in the system. Finally, inspect the inlet pipe opening to ensure that the silt level or any foreign objects are not blocking the pipe.

Maintenance should be done utilizing proper personal protective equipment such as: safety glasses, hard-hat, gloves, first aid kit, etc. Maintenance should occur only when a sufficient

time has lapsed since the most recent rain event to allow for a static water condition for the duration of the maintenance process.
In the case that only trash and floatables need to be removed, and a netting configuration or a removable screening basket is utilized, a vacuum truck is not required. However, a vacuum truck is required if a fixed screening basket configuration is utilized. If the maintenance event is to include oil removal and or sediment removal a vacuum truck or similar equipment would be needed.

Install a new net assembly by sliding the netting frame down the support frame and ensure the netting lays over the plate assembly such that the netting is not restricted. To order additional disposable nets, contact your local SiteSaver representative. New nets come with tie wraps temporarily holding the net material to the frame component for easy handling and storage. It is not recommended to remove the tie wraps until the net is ready to be installed. The frame is tapered from top (widest part) to bottom, and is also tapered from front (towards the sewer) to back. Cut the tie wraps that secures the netting material to the frame for shipment and lower the net down the guide rails. If debris has accumulated in the net support frame, remove the objects so the new net seats fully in the channel when installed.
When lowering the net, the following details should be exercised when placing the net:

- Watch the lowering to make sure that there are no unexpected entanglements.
- Be careful not to let the toe of the net get caught under the frame when it reaches the bottom of the support frame. This is typically accomplished by holding the toe of the net until after the net has started to prop into place.
- Ensure the netting lays over the plate assembly such that the netting is not restricted.

Access to the netting chamber can be achieved via the square grated opening atop the Site Saver unit. Trash net needs to be removed completely (including the frame) with a service vehicle (crane/hoist/boom truck).

For sediment removal, the SiteSaver is designed with clear access at both the inlet and outlet. A vacuum truck, or similar trailer mounted equipment, can be used to remove the sediment, hydrocarbons, and water within the unit. For more effective removal, it is recommended to use sewer jetting equipment or a spray lance to force the sediment to the vacuum hose. When the floor is sufficiently cleaned, fill the system back to its normal water elevation (to the pipe inverts).

Complete a post maintenance inspection to ensure that all components have been replaced and are properly secured within the SiteSaver device. It is a good practice to take time stamped photographs after every maintenance event to include within maintenance logs. After verifying all components, secure the access openings and ensure proper disposal of all pollutants removed during maintenance per local, state, and federal guidelines.

Proof of inspections and maintenance is the responsibility of the owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis. Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of the standard operating procedure. It is good practice to keep records of rainfall events between maintenance events and the weight of material removed, even if no report is required.

F. Sand Filter

Sand filter beds can crust over and become clogged or partially clogged, for this reason we recommend inspecting the sand filters at least annually. To remove this, the upper layer of clogged and / or hardened sand will need to be broken up with a steel rake or a similar device. After breaking up the top 2-5 inches of contaminated media, the lose sand can be scrapped off and removed via a vacuum truck. Replace and regrade the media with the approved material per the original design.

Various contractors specialize in this work. Maintenance methodologies range from manual replacement and removal to robotic devices that require no human entry into the system. Please consult to local maintenance contractors for additional information.

6. Inspection Reports

Proof of these inspections is the responsibility of the property owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis.

Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of your standard operating procedure. Please see Appendix A for a sample Inspection and Maintenance form.

Appendix A

Sample inspection and maintenance log

Underground Detention System Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	**Time:**	**Weather Conditions:**	**Date of Last Inspection:**
Inspector:		**Title:**	
Rain in Last 48 Hours □ **Yes** □ **No**		**If yes, list amount and timing:**	
Pretreatment: □ **vegetated filter strip** □ **swale** □ **turf grass** □ **forebay** □ **other, specify:**			□ **none**
Site Plan or As-Built Plan Available: □ **Yes** □ **No**			

*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.
*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.
* Properly dispose of all wastes.

Inspection Item		Comment	Action Needed
1. PRETREATMENT			
Sediment has accumulated.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Trash and debris have accumulated.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
2. INLETS			
Inlets are in poor structural condition.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Sediment, trash, or debris have accumulated and/or is blocking the inlets.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
3. CHAMBERS			
Sediment accumulation threshold has been reached.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Trash and debris have accumulated in chambers.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
4. OTHER SYSTEM COMPONENTS			
Structural deterioration is evident.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
5. OUTLETS			
Outlets in poor structural condition.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Sediment, trash or debris are blocking outlets.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Erosion is occurring around outlets.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
6. OTHER			
Evidence of ponding water on area draining to system.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Evidence that water is not being conveyed through the system.	☐**Yes** ☐**No** ☐**N/A**		☐**Yes** ☐**No**
Additional Notes			
Wet weather inspection needed □ **Yes** □ **No**			

INFILTRATION SYSTEMS

O&M Manual

ADS StormTech™

The Isolator® Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-7200 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow stormwater to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row Plus chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the chamber's sidewall. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-7200 models as these chambers do not have perforated side walls.

The Isolator Row Plus is designed to capture the "first flush" runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

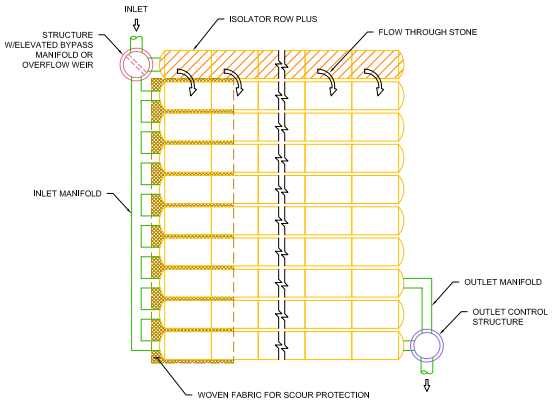
The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

Note: *See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.*

Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.

StormTech Isolator Row PLUS with Overflow Spillway (not to scale)



Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

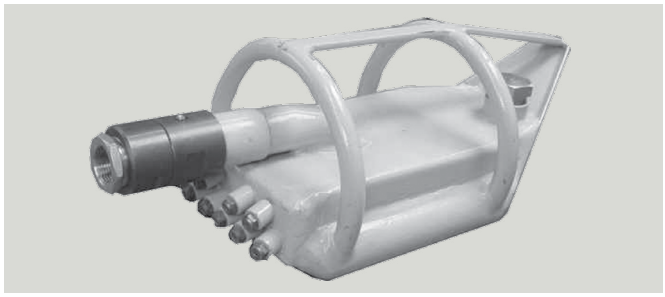
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

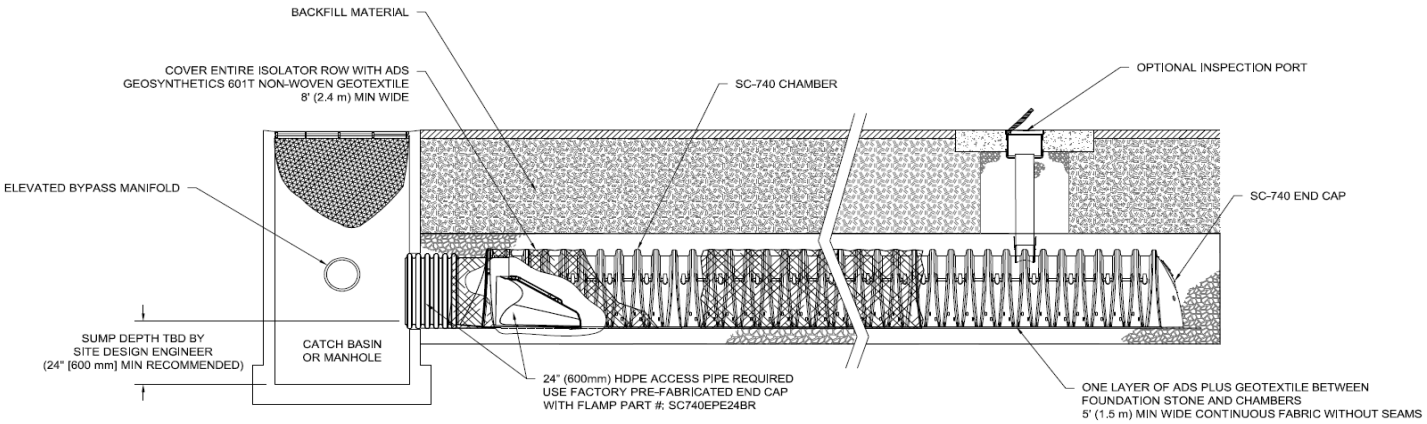
The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**



StormTech Isolator Row PLUS (*not to scale*)

Note: *Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-7200 chamber models and is not required over the entire Isolator Row PLUS.*



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
- i. Remove lid from floor box frame
- ii. Remove cap from inspection riser
- iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
- iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
- i. Remove cover from manhole at upstream end of Isolator Row Plus
- ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
  1. Mirrors on poles or cameras may be used to avoid a confined space entry
  2. Follow OSHA regulations for confined space entry if entering manhole
- iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
  If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

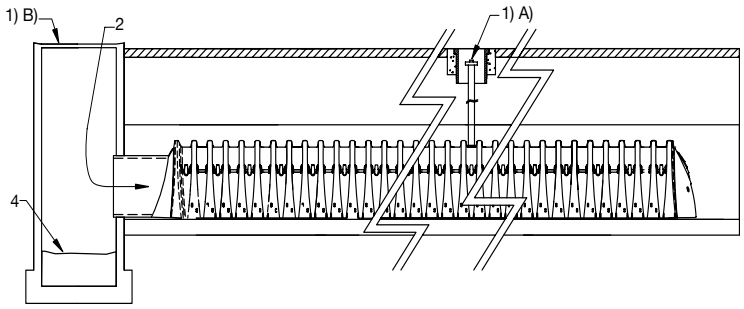
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.

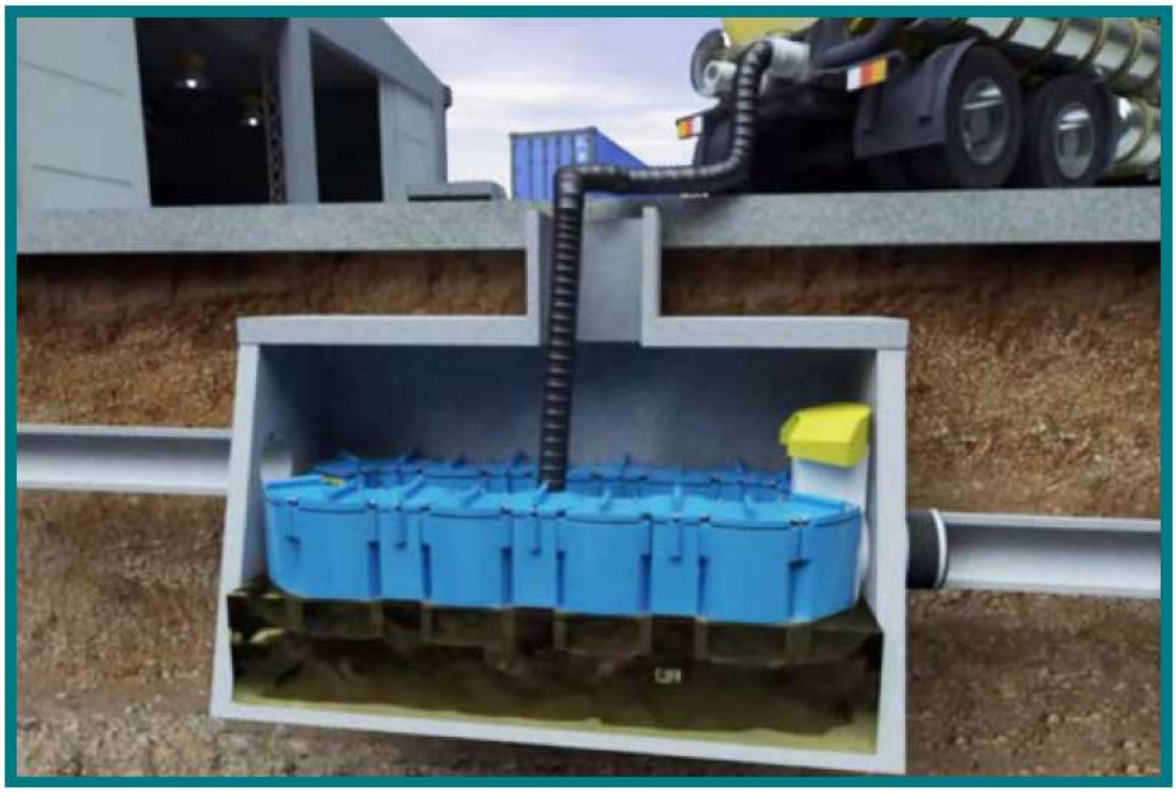


Sample Maintenance Log

Date	Stadia Rod Readings		Sedi-ment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

adspipe.com
800-821-6710

Hydro International



Operation and Maintenance Manual

Up-Flo® Filter

Filtration System for Stormwater Treatment

Stormwater Solutions

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Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Overview & Product Description

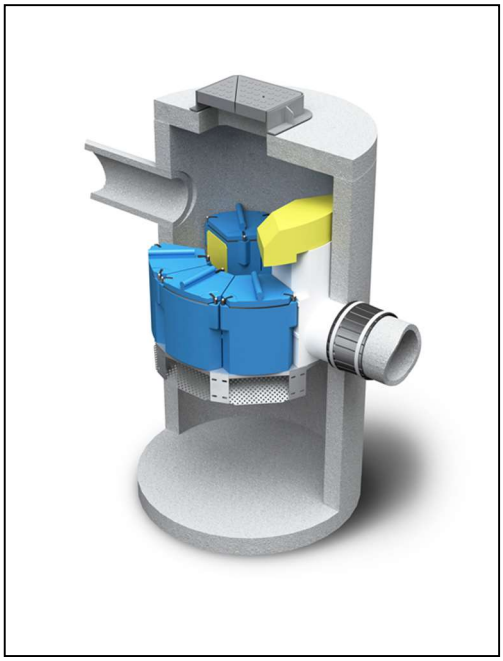
DON'T WANT TO GO IT ALONE? CALL HYDRO AND WE'LL TAKE CARE OF INSPECTION, REPLACEMENT MEDIA AND CLEANOUT.

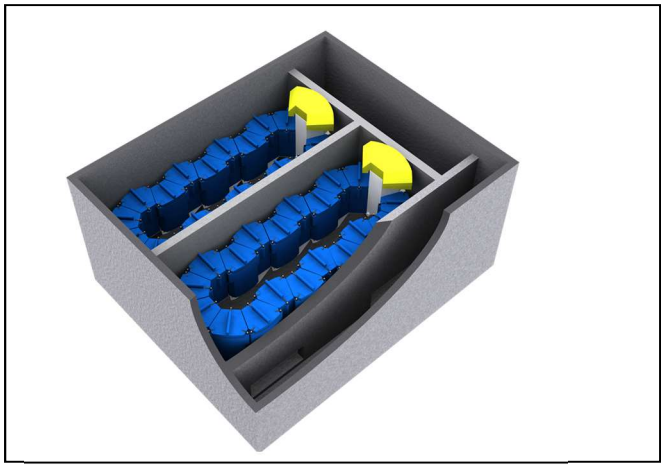
CALL 1 (888) 382-7808 FOR A QUOTE

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as dissolved and particulate metals and nutrients from stormwater runoff. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations.

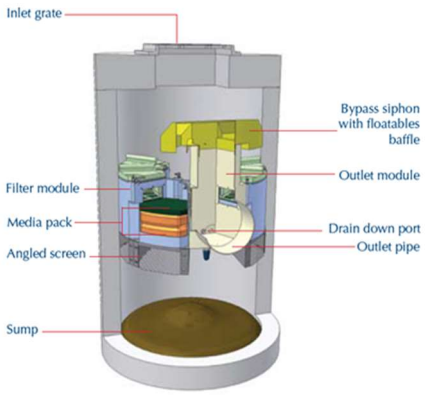
In order to sustain expected flow and removal rates for the Up-Flo® Filter, annual replacement of the Media Pack and removal of accumulated sediment from the sump is required. Depending on site use and pollutant characteristics, annual rainfall, design and functionality of the stormdrain conveyance system, annual replacement and clean out may be more or less often.

The Up-Flo Filter has modular components that connect together to form a ring of 1-6 Filter Modules or linearly to fit into rectangular precast structures with filter bays. Each filter bay can house 1-19 Filter Modules and precast structures can be constructed with multiple filter bays. Each Filter Module will have either a filtration Media Pack or filtration Ribbons.

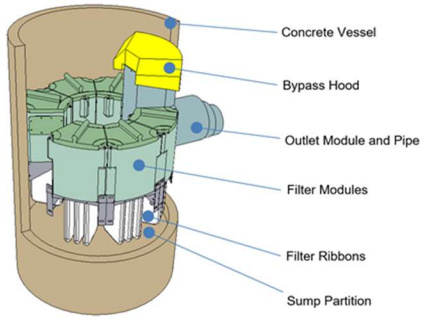




It does not matter what type of media is used, the Filter Modules house the filtration medium and the precast structure is used to suspend the Filter Modules to provide a sedimentation sump. Stainless steel support frames are used to support the Filter Modules and attach them to the precast structure. An Outlet Module (with hood) is used to connect the Filter Modules to a discharge pipe and convey filtered water away from the treatment area. A Draindown Filter and screen are provided when filtration media is used but not with filtration Ribbons.



Up-Flo with Filtration Media



Up-Flo with Filtration Ribbons

Maintenance activities can be categorized by those that can be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the vessel includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Packs (Filter Bags, flow Distribution Media and Draindown) or filtration Ribbons. A vactor truck is required for removal of oils, water, sediment, and to enter the vessel for performing inside maintenance. OSHA Confined Space Entry procedures need to be followed when entering the Up-Flo® vessel.

Inspection

The frequency of inspection and maintenance can be determined in the field after installation. Based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and site maintenance (e.g., sanding and sweeping), inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Typically, maintenance is recommended once per year thereafter.

By removing the manhole cover during a storm and monitoring the water level in the manhole or vault, site personnel can determine whether the filter is in bypass. A properly-sized filter that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance. Otherwise, scheduled inspections will determine when one or more of the following maintenance thresholds have been reached:

- Sediment depth at sump storage capacity. Up-Flo Filter with Filtration Media - Minimum 8" should separate the Draindown filter inlet from stored sediment in the sump. Up-Flo® Filter with Ribbon 285R – Minimum 6" should separate the bottom of the filtration Ribbons and sump floor. Up-Flo® Filter with Ribbon 450R – Minimum 1" should separate the bottom of the filtration Ribbons and sump floor. A simple probe, such as the Sludge-Judge®, can be used to determine the depth of the solids in the sump.

- Clogging of the Media Bags. Minimum filtration rate is generally reached when: Up-Flo® Filter with Filtration Media have accumulated approximately 20 lbs of sediment. Up-Flo® Filter with Ribbon 285R have accumulated approximately 8 lbs of sediment. Up-Flo® Filter with Ribbon 450R have accumulated approximately 15 lbs of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately or removing the filter Ribbon assembly for weighing. A spent Media Bag weighs approximately 50 lbs wet. A 285R filter Ribbon assembly from one module weighs approximately 15 lbs wet and a 450R filter Ribbon assembly from one module weighs approximately 30 lbs.

- Draindown filter clogged. With modules supplied with filtration media, the Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. If inspection one to two days after a storm event indicates otherwise, the Drain Down Filter has likely become clogged with sediment.

- Slime and debris covering the flow distribution media, angled screens or filtration Ribbons. After removal of the Media Bags or filtration Ribbons, the bottom flow distribution media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the angled screen should be inspected for blockages and ragging.

- Oil forming a measureable thickness on the surface of the water. Since water in the Up-Flo® vessel drains down to an elevation below the bottom of the Filter Modules when the system is idle, the amount of accumulated oils must be minimized so that oils are not entrained into the Media Pack when stormwater begins to fill the vessel at the start of a storm event.

- Floatables completely covering the surface of the water. Similar to oils, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the angled screens when stormwater begins to fill the Up-Flo® vessel at the start of a storm event.

The site-specific solids loading rate in the sump and in the Media Packs will be determined during the first year of Up-Flo® Filter operation. Starting with a clean sump, the solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since it was cleaned. Similarly, starting with fresh Media Bags or Ribbons, the solids loading rate in the Media Packs and Ribbons will be calculated by weighing the Media Bags or Ribbons and dividing the weights by the respective time interval since they were installed. The wet weight of the heaviest bag or Ribbon assembly from a single module will be used to determine the loading rate.

After completion of the first year of operation, the inspection and maintenance intervals for cleaning the sump and replacing Media Bags or Ribbons will be established to keep the solids loading within the respective limits of the sump and filter medium. Replacement of the Draindown Filter, replacement of flow Distribution Media, and removal of oils and floatables will occur at the same frequency unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate.

Maintenance

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and comfortably remove and replace Media Packs or Ribbon assemblies. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo® Filter has been installed in a very shallow unit, it is necessary to have personnel with OSHA-confined space entry performing the maintenance that occurs inside the vessel.

Maintenance activities include inspection, floatables removal, oil removal, sediment removal, Media Pack and Ribbon assembly replacement, and Draindown Filter replacement. Filtration medium housed in the Filter Modules is easily accessed by loosening three latches used to secure the Filter Module Lid. Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Draindown Filter. All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Good housekeeping practices upstream of the Up-Flo® Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from the elements will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

Up-Flo Filter Inspection & Maintenance Logs

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATION:	
OWNER:	SITE CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): MANHOLE VAULT SYSTEM

TOTAL NUMBER OF UP-FLO® FILTER MODULES: _____

Hydro International

Up-Flo® Filter Inspection Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions*: _____

**(Stable, Under Construction, Needing Maintenance, etc.)*

Inspection Frequency Key: A=annual; M=monthly; S=after major storms

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	M			
Facility (internally) free of debris?	M			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo® Filter)	A			
Grass mowed?	M			
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition				
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other				
Noticeable odors?	A			
Any evidence of filter(s) clogging?	M			
Evidence of flow bypassing facility?	A			

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter**: ☐ Acceptable ☐ Unacceptable

***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____

Hydro International

Up-Flo® Filter Maintenance Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions: _____
**(Stable, Under Construction, Needing Maintenance, etc.)*

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Modules fitted with new media packs: _____

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter: ☐ Acceptable ☐ Unacceptable
***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

Maintained by: (signature) _____

Maintained by: (printed) _____

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TECHNICAL BULLETIN // **UP-FLO™ FILTER**

FIELD EVALUATION OF PHOSPHORUS REMOVAL

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SW-UF-001-06

FIELD EVALUATION OF PHOSPHORUS REMOVAL

INTRODUCTION

Historically, the main pollutant of concern in stormwater runoff has been total suspended solids (TSS). However, there has been an increasing awareness of the environmental degradation caused by the array of secondary constituents found in stormwater runoff, such as nutrients, metals and organics. The issue of how to control secondary constituents has become a focus within the field of stormwater management. A study by leading stormwater researchers (Morquecho, et al., 2005[1]) showed a strong association between the removal of very fine Total Suspended Solids (TSS) with the removal of a broad range of secondary constituents. These findings were recently confirmed in an Up-Flo™ Filter study conducted by Dr. Robert Pitt's research team at the University of Alabama. The study concluded that the Up Flo™ Filter removed over 80% of TSS including the very fine material. It was also shown that the Up-Flo™ Filter removed 72% of Total Phosphorus by virtue of the association of phosphorus with very fine particle sizes in conformance with the earlier study by Morquecho, *et al.*

ASSOCIATION OF STORMWATER POLLUTANTS WITH DIFFERENT SIZE PARTICULATES

The study by Morquecho et al. (2005) assessed particulate matter found in stormwater runoff for its concentrations of various secondary constituents and found a strong correlation between particulate particle size and secondary constituent concentrations. The very fine particulate fractions were found to have the highest concentrations of particulate and particle-bound phosphorus. The report concluded that a reduction of fine particulate matter will lead to a reduction of Total Phosphorus. Specifically, the study showed that 71% of Phosphate and 68% of Total Phosphorus would be removed if all particles greater than 20 µm in diameter were removed. When considering the removal of all particulates down to 5 µm, removals of 78% of Phosphate and 82% of Total Phosphorus were observed.

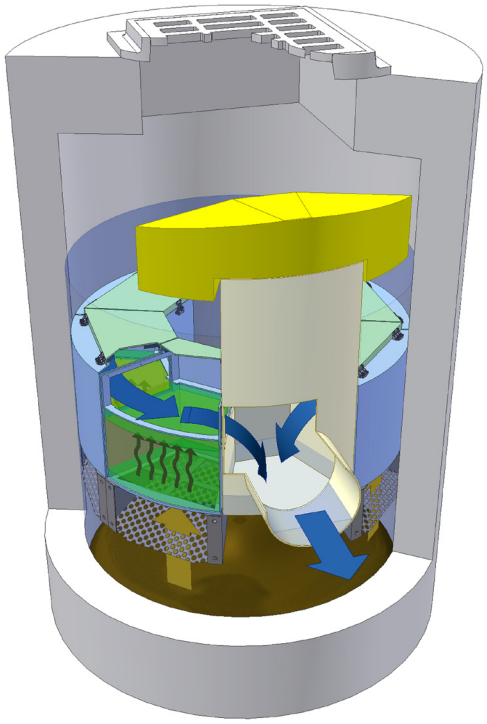


Figure 1: Up-Flo™ Filter Stormwater Treatment System

FIELD EVALUTATION OF THE UP-FLO™ FILTER

An Up-Flo™ Filter unit with CPZ Mix™ Media was installed in a catch basin at the Tuscaloosa City Hall parking lot in Tuscaloosa, Alabama in February 2005. The unit was monitored for Total Suspended Solids (TSS) removal efficiency over a 10-month period from March – November 2005. Sampling at the test site was conducted using two ISCO 6712 automatic samplers, one located in the inlet chamber of the Up-Flo™ Filter and the other located in the outlet pipe of the treatment unit. Two ISCO 4250 area-velocity meters were used to calculate flow rate in the inlet chamber and in the effluent pipe. The rainfall intensity and amount was measured using a standard tipping bucket rain gauge. YSI 6600 water quality sondes were used to measure the real time water quality data (temperature, dissolved oxygen, pH, ORP,

turbidity, conductivity, and water depth) of the influent and the effluent flows at 1-minute intervals during storm flows and at 5-minute intervals during inter-event periods.

A total of 31 rain events were sampled. The samples were divided using a Dekaport/USGS cone splitter and analyzed for Total Suspended Solids concentration using EPA Method 160.3 (SM 2540 D) and particle size distribution using a Coulter Counter/Multi Sizer III. The average influent TSS concentration for all samples taken by the ISCO 6712 automatic sampler was 64.7 mg/L, with a mean particle size of 30 µm. The average effluent TSS concentration for all samples taken by the automatic sampler was 19 mg/L with a mean particle size of 25 µm.

At the conclusion of the monitoring period, all the material captured in the sump was removed and analyzed. Contrary to the average particle size of particulate matter observed in the influent samples taken by the automatic sampler, the sump material contained a large amount of coarser particles. A particle size distribution analysis conducted on the sump material confirmed that the bulk of the material in the sump was coarse (in the 250 – 2000 µm range), as the finer materials were captured and stored within the filtration media. A summary of the particle size analysis of the sump material is shown in **Table 1**.

Particle Size Range (µm)	Particulate in Range	
	(kg)	(% Mass)
< 75	1.1	2.0
75 – 150	1.6	3.0
150 – 250	3.6	6.7
250 – 425	11.5	21.4
425 – 850	17.1	31.8
850 – 2000	10.5	19.6
2000 – 4750	4.8	8.9
>4750	3.5	6.5
Sum	53.7	100

Table 1: Particle size analysis of material captured in the Up-Flo™ Filter sump over the duration of the monitoring period

Figure 2 compares the TSS gradation of the sump material with the TSS gradations observed in the influent samples taken by the automatic samplers. As it is shown, the influent sampler data did not reflect the amount of coarse material captured in the sump.

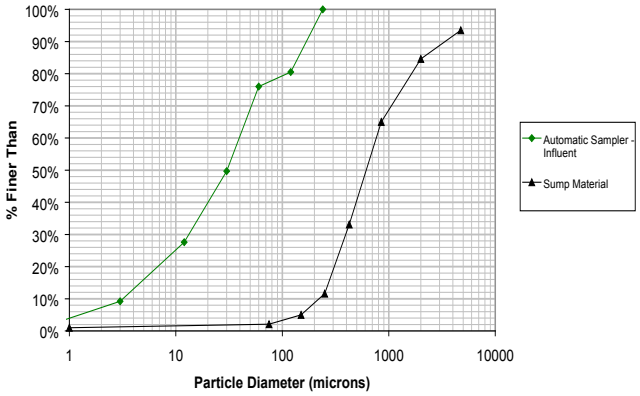


Figure 2: Average particle size distributions of all influent and effluent samples taken with the ISCO 6712 automatic samplers as compared to the particle size distribution of material captured within the sump

The total runoff volume treated by the Up-Flo™ Filter for the 10-month monitoring period was 1,570,000 liters (55,500 ft^3). The average influent and effluent TSS concentrations for all samples were determined to be 64.7 mg/L and 19.2 mg/L, respectively. To determine the total mass of material for the 0.45 – 3 µm, 3-12 µm, 12-30 µm, 30-60 µm, 60-120 µm and 120-240 µm particle size ranges, the average TSS concentrations in the range for the ISCO 6712 influent samples were used. For example, the total mass of material in the influent for the 0.45 - 3 µm range was determined using the following equation:

$$m_{\text{influent: 0.45 - 3 µm}} = 5.9 \text{ mg/L} \times 1.57\text{E}6 \text{ L} \times 1\text{kg}/1\text{E}6 \text{ mg}$$

$$= 9.3 \text{ kg}_{\text{0.45 - 3 µm material}}$$

$$m_{\text{influent: 0.45 - 3 µm}} = 9.3 \text{ kg}_{\text{0.45 - 3 µm material}}$$

Table 2 summarizes the mass of particulate material in the influent and effluent based on the samples collected by the automatic samplers.

Particle Size Range (µm)	Influent		Effluent	
	Avg Concentration of Automatic Sampler Samples (mg/L)	Total Mass in Range over Duration of Monitoring Period (kg)	Avg Concentration of Automatic Sampler Samples (mg/L)	Total Mass in Range over Duration Monitoring Period (kg)
0.45 – 3.0	5.9	9.3	1.8	2.8
3.0 – 12.0	11.9	18.7	4.1	6.4
12.0 – 30	14.3	22.4	4.9	7.7
30 – 60	17.0	26.7	4.3	6.8
60 – 120	2.9	4.6	1.1	1.8
120 – 240	12.6	19.7	2.7	4.3
> 240	0.0	0.0	0.0	0.0
Sum	**64.7**	**101.5**	**19.2**	**29.9**

Table 2:Total mass of particulate material in influent based on average TSS concentrations from automatic samplers for <240-micron particle size ranges

A composite gradation of all influent particulate material is shown in **Table 3**. Table 3 combines the 0 – 240 µm particle size ranges from Table 2 and the 250 – 4750 µm particle size ranges from Table 1. The influent automatic samplers picked up no material greater than 240 µm, yet there was a great deal of material greater than 250 µm in diameter captured within the sump. Thus, in estimating the total influent mass of coarser (>250 µm) particles for

Particle Size Range (µm)	Total Particulate Mass during Monitoring Period (kg)		% Reduction
	Influent	Effluent	
0.45 – 3.0	9.3	2.8	70
3.0 – 12.0	18.7	6.4	66
12.0 – 30	22.4	7.7	66
30 – 60	26.7	6.8	74
60 – 120	4.6	1.8	61
120 – 250	19.7	4.3	78
250 – 425	11.5	--*	100
425 – 850	17.1	--*	100
850 – 2000	10.5	--*	100
2000 – 4750	4.8	--*	100
>4750	3.5	--*	100
Sum	**149.1†**	**29.9**	**80**

Table 3: Mass balance calculation for net suspended solids removed during the monitoring period as reported by the University of Alabama research team

Based on the measured particle size distribution of particulate material in the effluent samplers shown in Figure 3, it is assumed that all material >250 µm is removed by the Up-Flo™ Filter system.

†Of the 149.1 kg total material removed by the Up-Flo™ Filter, Table 1 shows that 53.7 kg of coarse particulate material was removed by the sump. The remainder of the material was the fine fraction, which was removed by filtration within the filter media.

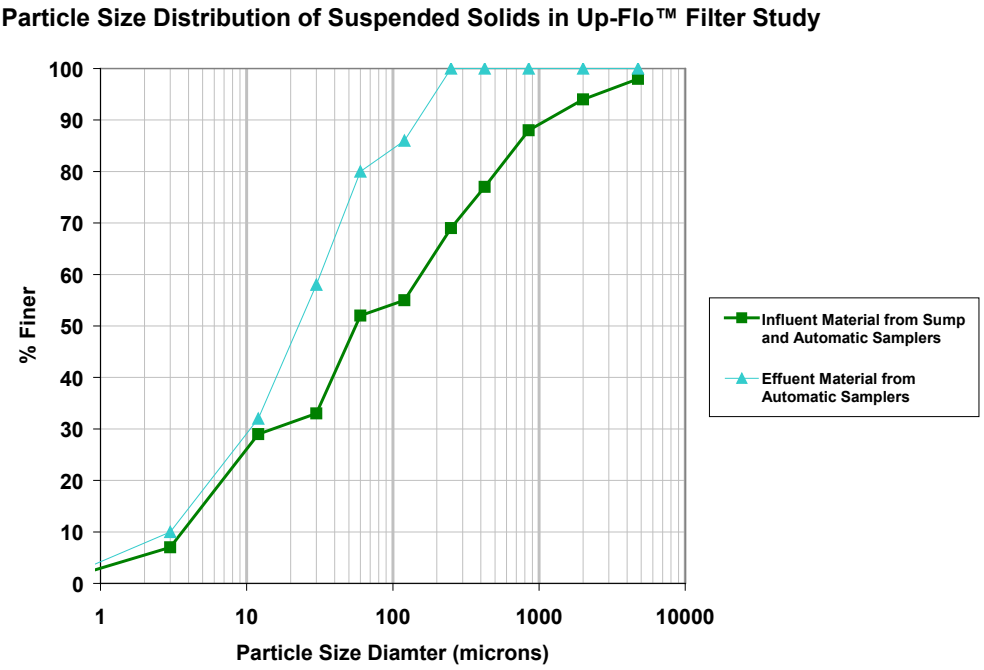


Figure 3: Particle size distributions of influent material considering all samples taken with ISCO 6712 automatic samplers and material captured in the sump

the monitoring period, only the mass of material from the sump collection was considered. The total mass of material for the 250 - 425 µm, 425 – 850 µm, 850 – 2000 µm, 2000 – 4750 µm and >4750 µm particle size ranges was taken directly from Table 1, above.

Based on the observed effluent particle size characterization shown in **Figure 3**, it is implicit that all particles greater than 250 µm in diameter are captured by the Up-Flo™ Filter. The particle size gradation for the composite influent material from Table 3 is shown graphically in Figure 3.

ANALYSIS FOR PHOSPHORUS CAPTURED BY THE UP-FLO™ FILTER

The sediment gradations from the sump analysis were then analyzed for their concentrations of phosphorus using EPA Method 365.2 (SM 4500-P B, 5 and P.E.). The sediment analysis indicated a strong correlation between the removal of very fine particulates and phosphorus removal. As shown in **Table 4**, the highest concentration of phosphorus is associated with the <75 µm particle size range.

Particle Size Range (µm)	Concentration of P (mg/kg)
< 75	3580
75 – 150	1620
150 – 250	511
250 – 425	315
425 – 850	496
850 – 2000	854
2000 – 4750	1400
>4750	1700

Table 4: Measured phosphorus concentrations associated with different gradations of particulate matter collected from the Up-Flo™ Filter sump as reported by the University of Alabama

TOTAL PHOSPHORUS REMOVAL WITH THE UP-FLO™ FILTER

The total mass of phosphorus in the influent and effluent was calculated by applying the phosphorus concentrations for each particle size range shown in Table 4 to the influent and effluent mass of total suspended solids for the influent and effluent given in Table 3 (refer to the example equation on the following page).

$$P_{influent\ 0.45 - 3\ \mu m} = 3580\ mg_P/kg_{Particulate\ Mass\text{-}Influent} \times 9.3\ kg_{Particulate\ Mass\text{-}Influent} \times 1\ gm_P/1000\ mg_P = 33.4\ gm$$

$$P_{Effluent\ 0.45 - 3\ \mu m} = 3580\ mg_P/kg_{Particulate\ Mass\text{-}Enfluent} \times 2.8\ kg_{Particulate\ Mass\text{-}Influent} \times 1\ gm_P/1000\ mg_P = 10.0\ gm$$

$$\%\ Reduction_{P\ 0.45 - 3\ \mu m} = [(33.4\ gm_{P\ influent\ 0.45 - 3\ \mu m} - 10.0\ gm_{P\ Effluent\ 0.45 - 3\ \mu m}) / 33.4\ gm_{P\ Influent\ 0.45 - 3\ \mu m}] \times 100 = 70\%$$

Based on the associations of phosphorus with the specified particle size gradations, the removal of Total Phosphorus for the 10-month monitoring period was determined to be 72%. The phosphorus removal evaluation by mass balance is shown in Table 5.

CONCLUSIONS

The results from Up-Flo™ Filter field study confirm earlier findings that certain secondary constituents, such as Total Phosphorus, can be reduced by reducing the overall concentration of particulate matter. Field monitoring results show that the Up-Flo™ Filter removed 80% of fine Total Suspended Solids from stormwater runoff over a 10-month monitoring program. Analysis of the sediment captured in the sump at the conclusion of the monitoring period showed that phosphorus is strongly associated with particulate in the <75 µm particle size range. The conservative mass balance evaluation shows with a high degree of confidence that the Up-Flo™ Filter removes 72% of Total Phosphorus from stormwater runoff. A full copy of the University of Alabama Field Verification Report for the Up-Flo™ Filter is available upon request.

Particle Size Range (µm)	P (mg/kg)	Influent		Effluent		P Captured in Sump (gm)	% Reduction
		Suspended Solids (kg)	$P_{influent}$ (gm)	Suspended Solids (kg)	$P_{effluent}$ (gm)		
0.45 – 3.0	3580	9.3	33.4	2.8	10.0	23.4	70
3.0 – 12.0	3580	18.7	66.9	6.4	22.9	44.0	66
12.0 – 30	3580	22.4	80.2	7.7	27.6	52.7	66
30 – 60	3580	26.7	95.6	6.8	24.3	71.1	74
60 – 120	1620	4.6	7.5	1.8	2.9	4.6	61
120 – 250	511	19.7	10.1	4.3	2.2	7.9	78
250 – 425	315	11.5	3.6	--	--	3.6	100
425 – 850	496	17.1	8.5	--	--	8.5	100
850 – 2000	854	10.5	9.0	--	--	9.0	100
2000 – 4750	1400	4.8	6.7	--	--	6.7	100
>4750	1700	3.5	6.0	--	--	6.0	100
Sum	**--**	**149.1**	**328.1**	**29.9**	**90.3**	**237.6**	**72**

Table 5: Mass balance calculation for net Phosphorus removed during the monitoring period as reported by the University of Alabama

1. Morquecho, R., R. Pitt, S. Clark. Pollutant Associations with Particulates in Stormwater. World Water & Environmental Resources Contress, ASCE/EWRI. Anchorage, Alaska. May 15 – 19, 2005. January 2005.

Technical Abstract
First Defense® - High Capacity

NJCAT Verified 80% TSS Removal for 50 to 150 µm Particle Size Range

Introduction

Hydro International has a state-of-the-art hydraulics and test facility that is used both to develop products and to evaluate performance. Through controlled testing using industry standard test protocols, Hydro's treatment products are evaluated under varying hydraulic and sediment load conditions. With a known drainage area or water quality flow rate, these test results are used to benchmark treatment objectives and to select the correct model size.

A common stormwater treatment goal for manufactured treatment devices is to reduce the Total Suspended Solids (TSS) concentration by at least 80%. To comply with this goal, a silica-based test sand with known particle size gradation (PSD) and density is injected into the treatment system at different flow rates. With known TSS concentrations and particle sizes before and after treatment, efficiency curves are plotted and used to predict TSS reductions for a range of particle sizes.

OK110 Silica Test Sand

U.S. Silica OK110 is a common test sand that has been used by the industry but is no longer available. However, its PSD can be modelled from a blend of silica sands having a wide range of particle sizes. This abstract summarizes test results based on a particle size range similar to OK110 for the First Defense® High Capacity (FDHC). All test protocols and results have been independently verified by the New Jersey Corporation for Advanced Technology (NJCAT). The full report can be viewed at: FDHC_PSD_Removal_Verification_Report_9-16.pdf

First Defense High Capacity (FDHC)

The FDHC (Figure 1) has patented flow modifying internal components that create a gentle swirling flow path within the Vortex Chamber. The rotating flow creates low energy vortex forces that supplement gravitational settling forces to enhance separation of pollutants.

The internal components are fit into precast manholes to collect runoff as part of typical drainage network system. During rain events, flow enters either from a surface inlet grate or inlet pipe. As flow enters the manhole, components divert flow and pollutants into a Vortex Chamber beneath a separation module, that includes both Inlet\Outlet Chutes and Bypass Weirs. The internal Bypass Weirs divert peak flows over the separation module and away from the Vortex Chamber where pollutants are collecting. This prevents high velocities from re-suspending captured pollutants during infrequent but large storm events.

Capable of providing high pollutant removals for a wide range of flow rates and pipe sizes, the FDHC can be installed ether online or offline depending on pipes and peak flows. Its efficiency and simplicity make it economical to install and maintain.

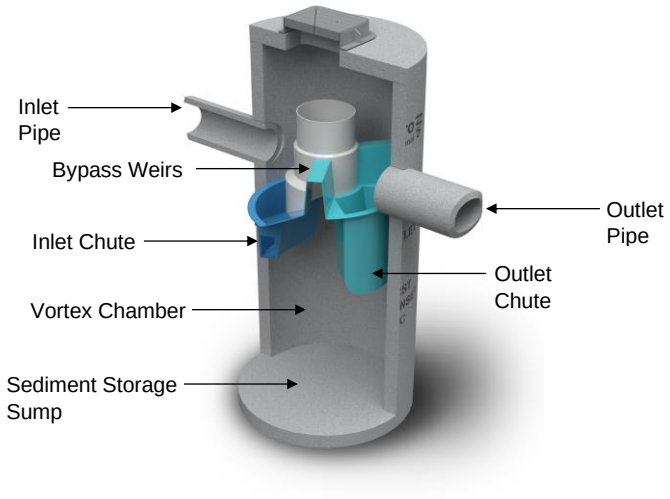


Figure 1 - First Defense High Capacity

Laboratory Testing Arrangement

The laboratory setup (Figure 2) consisted of a recirculating closed loop system with an 8-inch (200 mm) submersible Flygt pump that conveyed water from a 23,000 gal (87,064 L) reservoir through a PVC pipe network to the 4-ft (1.2m) FDHC. The flow rate of the pump was controlled by a GE Fuji Electric AF-300 P11 Adjustable Frequency Drive and measured by an EMCO Flow Systems 4411e Electromagnetic Flow Transmitter. Test sand was injected into the incoming flow stream using a volumetric screw feeder situated 10-ft prior to entering the test unit.

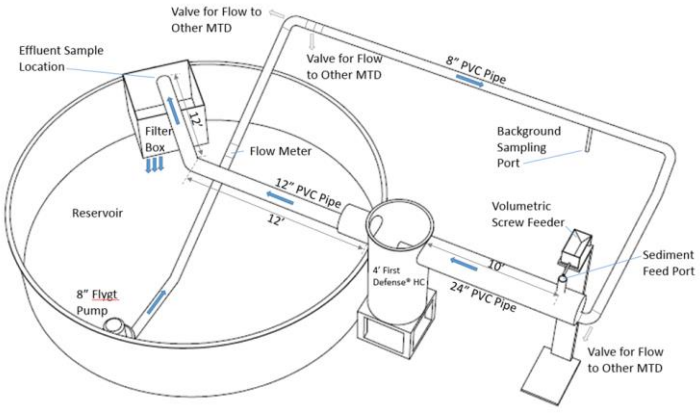


Figure 2 - Set-up of the Portland, Maine hydraulic testing facility

Test Sediment

The feed sediment injected into the inlet during removal efficiency testing was a blend of commercially available silica sands ranging from 2 µm to 1,000 µm. The PSD of the test sediment was analyzed by an independent laboratory in accordance with ASTM D 422-63.

First Defense® - High Capacity

To evaluate the performance consistent with OK110 test sand, results were analyzed from the particle sizes range of 50 µm to 150 µm (D_{50}=108µm). A comparison between the 50 – 150 µm range and OK110 gradation is shown in Figure 3. The 50 – 150 µm test sand gradation is overall finer than OK110 between 50 µm and 100 µm. For example, the test sand had 15% finer than 75 µm compared to the OK110 PSD that had only 3% less than 75 microns. Given that finer particles are more difficult to remove, performance results for 50 to 150 µm PSD is considered conservative.

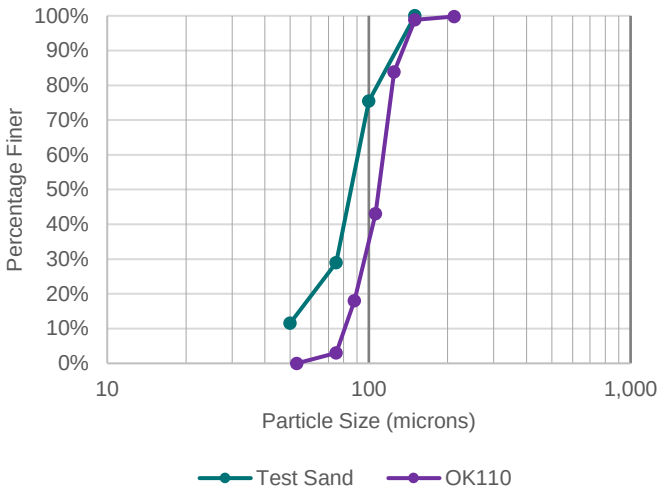


Figure 3 - Particle Size Distribution Comparison

Removal Efficiency Testing

Removal efficiency testing with the feed sediment was conducted in accordance with Section 5 of the NJDEP Laboratory Protocol for Manufactured Treatment Devices. Five flow rates ranging from 0.38 cfs to 1.88 cfs were tested to assess the performance trend.

The test sediment was fed into the flow stream at a rate that was equivalent to 200 mg/L. The average influent TSS concentration was calculated using the total sediment mass and volume of water added during dosing. The influent concentration for each particle size band was calculated using the percentage of particles in each particle size band and known average inlet concentration. Three time-spaced effluent grab samples were composited and analyzed using laser diffraction (ISO 13320) to evaluate the effluent particle sizes.

Table 1 – 50 – 150 µm Particle Size Range Test Results

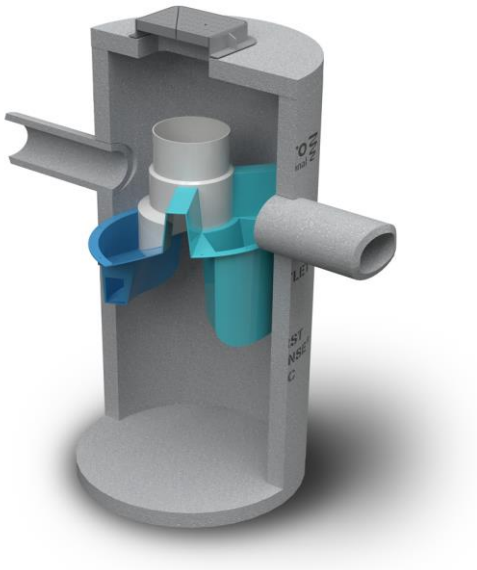
Flow	Inlet Mass	Outlet Mass	Removal
cfs (L/s)	grams	grams	%
0.38 (10.8)	1,554.6	107.1	93.1
0.75 (21.2)	1,761.0	150.8	91.4
1.13 (32.0)	1,872.8	127.2	93.2
1.5 (42.5)	2,203.2	226.7	89.7
1.88 (53.2)	2,366.6	303.8	87.2

The average effluent sediment concentration of the three composited samples was also measured for each flow rate in accordance with ASTM D3977-97. The effluent concentration for each particle size band was then calculated using the average effluent composite concentration and percentage of particles in each particle size band.

Percent removed at each of the five tested flow rates is shown in Table 1. Inlet concentrations of the OK110 particle size range varied from 79-84 mg/L compared to 4-8.5 mg/L at the outlet. As expected, the highest concentration measured at the outlet was at the highest tested flow rate of 1.88 cfs (53.2 L/s). In general, the 4-ft FDHC removed greater than 85% of the OK110 particle size range for all tested flow rates. Table 2 provides "Treatment Flow Rates" for the available models.

Table 2 – FDHC Treatment Flow Rate for > 85% OK110

Model:	FD-3HC	FD-4HC	FD-5HC	FD-6HC	FD-8HC	FD-10HC
Size:	3 ft (0.9 m)	4 ft (1.2 m)	5 ft (1.5 m)	6 ft (1.8 m)	8 ft (2.4 m)	10 ft (3.0 m)
cfs:	1.06	1.88	2.94	4.23	7.52	11.75
L/s:	30.02	53.2	83.3	119.8	212.9	332.6



For design purposes the selected model's Treatment Flow Rate must be equal or greater to the site's required Water Quality Flow Rate. The peak flow rate and maximum pipe size must be considered to determine whether an online or offline configuration is appropriate. Full removal curves are available on request.

Refer First Defense product information brochure or visit www.hydro-int.com/us for more information

Hydro International. 94 Hutchins Drive. Portland. ME 04102
Tel: 207.756.6200 Fax: 207.756.6212
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Stormwater Solutions

State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Division of Water Quality
Bureau of Nonpoint Pollution Control
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
Phone: 609-633-7021 / Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. McCABE
Commissioner

August 15, 2018

David Scott, CPSWQ
Technical Product Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Laboratory Certification
Up-Flo® Filter with 450R Filter Ribbon Media by Hydro International
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Scott:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the Up-Flo® Filter with 450R Filter Ribbon Media.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated June 2018) for this device is published online at http://www.njcat.org/uploads/newDocs/UPFLO450RVerificationReportFinal.pdf.

The NJDEP certifies the use of the Up-Flo® Filter with 450R Filter Ribbon Media by Hydro International at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 0.533 gpm/sf of effective filtration treatment area.

2. The Up-Flo® Filter with 450R Filter Ribbon Media shall be installed using the same configuration as the unit verified by NJCAT and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Up-Flo® Filter with 450R Filter Ribbon Media, which is attached to this document. However, it is recommended to review the maintenance website at https://www.hydro-int.com/sites/default/files/nj_uff_inspection_and_maintnenance.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for an Up-Flo® Filter with 450R Filter Ribbon Media. After determining the number of filter modules necessary, the corresponding model selection must be appropriate to hold at least that minimum number of filters.

   Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using an Up-Flo® Filter with 450R Filter Ribbon Media. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The selection of configuration for use in the Up-Flo® Filter with 450R Filter Ribbon Media is based upon both the MTFR and the maximum inflow drainage area. It is necessary to select the configuration using both methods and to rely on the method that results in the larger configuration determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the Up-Flo® Filter with 450R Filter Ribbon Media in this example is 0.25 acres. Based upon the information in Tables 1 and 2 below, the following minimum configuration is required for an Up-Flo® Filter with 450R Filter Ribbon Media to treat the impervious area without exceeding the maximum drainage area:

Drainage area = 0.25 acres
Max Allowable Inflow Area per Filter Module = 0.0245 acres/filter (Table 2 below)
0.25/0.0245 = 10.2 Filter Modules = 11 Filter Modules

Using Table 1 below, Model size UFF-ZV-25-450R with 11 filter modules and maximum allowable inflow drainage area of 0.27 acres may be used.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm/cfs=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum configuration is required for an Up-Flo® Filter with 450R Filter Ribbon Media to treat the impervious area without exceeding the MTFR:

Flow rate = 354.58 gpm
Max. Flow Rate per Filter Module = 10 gpm/Filter Module (Table 2 below)
354.58/10 = 35.46 Filter Modules = 36 Filter Modules

Using Table 1 below, Model size UFF-MH-25-450R with 36 filter modules, which would have an MTFR of 360 gpm, may be used.

The MTFR evaluation results will be used since that method results in the higher minimum configuration determined by the two methods.

The sizing table corresponding to the available system models are noted below:

Table 1: Up-Flo® Filter with 450R Filter Ribbon Media Configurations and NJDEP Sizing Table

Configuration	Model Size	Maximum Number of Filter Modules	Max. Filtration Rate (gpm)	Minimum Sedimentation Area (sq.ft.)	Minimum Wet Volume (cu.ft.)	Total Filtration Area (sq.ft.)	Total Mass Capture (lbs)	Maximum Allowable Inflow Area (acres)
Manhole	UFF-MH-450R	6	60	12.48	48.6	112.5	88.0	0.15
Vault	UFF-ZV-25-450R	50	500	104	405	937.5	733	1.22
Vault	UFF-ZV-50-450R	100	1000	208	810	1875	1466	2.44
Vault	UFF-ZV-75-450R	150	1500	312.0	1215	2813	2199	3.67

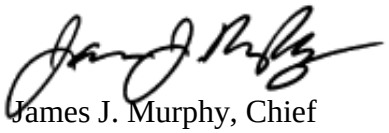
Table 2: Up-Flo® with 450R Filter Ribbon Media Design Specifications

Ribbon Model	Max. Flow per Filter Module (gpm/cfs)	Max. Allowable Inflow Area per Filter Module (acres)
450R	10/0.022	0.0245

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Nicholas Grotts of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Brian Salvo NJDEP – BNPC
Nicholas X. Grotts NJDEP – BNPC

BMP Accessories: Level Spreaders, Check Dams, Outlet Structures, Catch Basin Inserts

BMP accessories are not BMPs themselves but are required to facilitate the operation and function of BMPs. This section presents four of the most common and important BMP accessories: level spreaders, check dams, outlet structures, and catch basin inserts.

Level Spreaders

Description

A level spreader receives concentrated flow from channels, outlet structures, or other conveyance structures, and converts it to sheet flow where it can disperse uniformly across a stable slope. A level spreader is not a pollutant reduction device. It improves the efficiency of other BMPs, such as vegetated swales, filter strips, or infiltration systems that depend on sheet flow to operate properly.

Applicability and Planning Considerations

Level spreaders are used in wide, level areas where concentrated runoff occurs. They should be placed on undisturbed soil that has been stabilized with vegetation. Disturbed soils are more erodible. If the spreader is not absolutely level, flow will concentrate at the low point and may worsen erosion problems. Flows to the level spreader should be relatively free of sediment, or the level spreader could be quickly overwhelmed by sediment and lose its effectiveness.

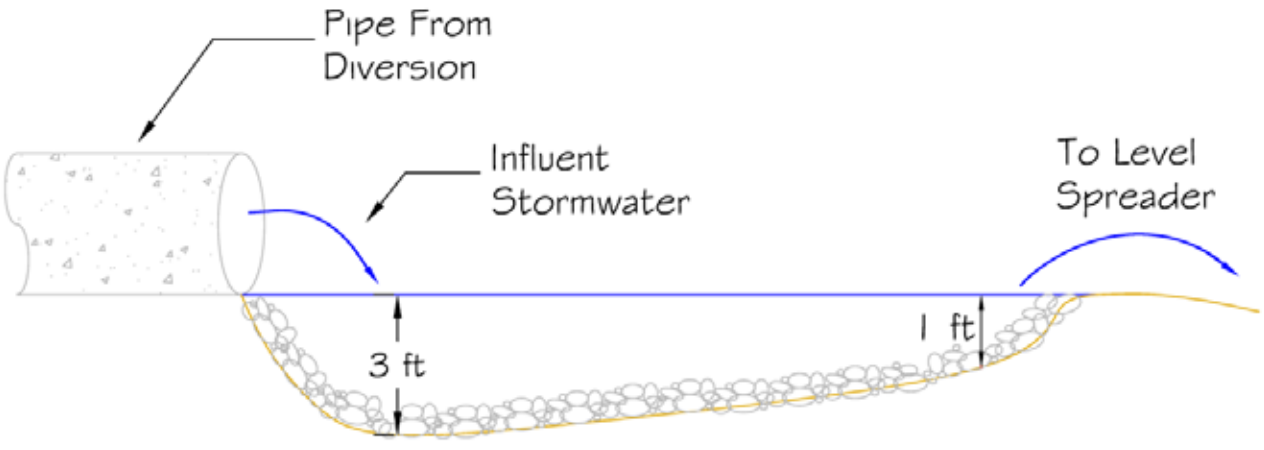
Design and Construction

Level spreaders are usually made of rocks, lumber, or concrete. Typical depths of flow behind each spreader range from 6 to 12 inches.

Construct level spreaders to be absolutely level. Small variations in height of even 0.25 inches can cause water to quickly concentrate and create erosion problems. A 4-inch variation in ground elevation across the entire length of the level spreader can make level construction difficult.

The height of the spreader is based on design flow, allowing for sediment and debris deposition. Design the length of the spreader based on the 10-year design flow for the site or the sheet flow path width, whichever is greater. When designing for the 10-year design flow, use the following table:

Level Spreader



adapted from the North Carolina State University

Drainage Area	Minimum spreader length
1 acre	10 feet
2 acres	10 feet
3 acres	15 feet
4 acres	18 feet
5 acres	20 feet

The slope leading to the level spreader should be less than 1% for at least 20 feet immediately upstream, to keep runoff velocities less than 2 feet per second during the 10-year storm event. The slope at the outlet of the spreader should be 6% or less.

Maintenance

Inspect level spreaders regularly, especially after large rainfall events. Note and repair any erosion or low spots in the spreader.

Adapted from:
Idaho Department of Environmental Quality. Catalog of Stormwater BMPs for Cities and Counties, 209-210.
MassDEP, Massachusetts Nonpoint Source Pollution Management Manual, 2006.
http://www.mass.gov/dep/water/laws/policies.htm#storm
Additional Resources:
Hunt, W.F. et al. Designing Level Spreaders to Treat Stormwater Runoff. North Carolina State University, as presented at North Carolina Department of Transportation Level Spreader Workshop, February 19, 2001, Raleigh, NC.

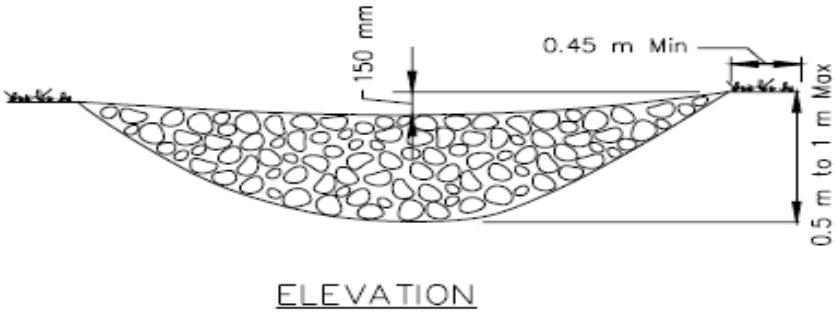
Check Dams

Description

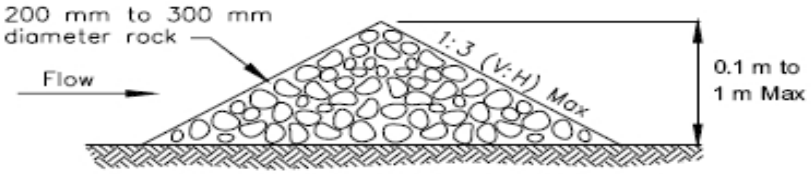
A check dam is a small dam constructed across a drainage ditch, swale, or channel to lower the velocity of flow. Reduced runoff velocity reduces erosion and gullying in the channel and allows sediments to settle out. A check dam may be built from stone, sandbags (filled with pea gravel), logs, or concrete. Check dams are relatively easy and inexpensive to construct. Permanent check dams should be constructed from stone or concrete. Sandbag dams filled with pea gravel or logs are suitable only as temporary practices. Never use a filter fence or a hay bale as a check dam, either on a temporary or permanent basis.

Applicability

Use check dams where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, where velocity checks are needed, or to induce stormwater exfiltration into the ground within a BMP such as a dry water quality swale. Check dams may also be used as a temporary or emergency measure to limit erosion by reducing flow in small open channels. Other uses for



ELEVATION



TYPICAL ROCK CHECK DAM SECTION

CHECK DAM
NOT TO SCALE

adapted from Caltrans Stormwater Handbooks

check dams include:

- To reduce flow in small temporary channels that are presently undergoing degradation,
- Where permanent stabilization is impractical due to the temporary nature of the problem,
- To reduce flow in small eroding channels where construction delays or weather conditions prevent timely installation of non-erosive liners.

Check dams can be installed in small open channels that drain 10 acres or less, or channels where stormwater velocities exceed 5 feet per second. Note that some BMPs such as grass channels require flows to not exceed 1 foot per second for the water quality volume. Check dams cause water to pond. Under low-flow situations, water ponds behind the structure and then slowly seeps through the check dam and/or exfiltrates into the underlying soil, depending on the soil permeability. Under high-flow situations, water flows over and/or through the structure.

Advantages

- Inexpensive and easy to install.
- Reduces velocity and may provide aeration of the water.
- Prevents gully erosion from occurring before vegetation is established, and also causes a high proportion of the sediment load in runoff to settle out.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading, etc.
- They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to capture sediment coming off that site.
- They must be constructed in dry water quality swales to reduce velocity and induce exfiltration.

Disadvantages

- May kill grass linings in channels if the water level remains high after rainstorms or if there is significant sedimentation.
- Clogging by leaves in the fall may be a problem.
- Should not be used in live streams
- Promotes sediment trapping but resuspension can occur during subsequent storms
- Require extensive maintenance following high velocity flows
- Should not be made from straw bales or silt fences

Design

Install check dams at a distance and a height to allow small pools to form behind them. Install the first check dam about 15 feet from the outfall device and at regular intervals after that, depending on slope and soil type. In multiple check dam installations, design the system so that backwater from the downstream check dam reaches the toe of the next upstream dam. High flows (typically a 2-year or larger storm) should flow over the check dam without increasing upstream flooding or damaging the dam. Form check dams by hand or mechanically. Never dump rock directly into the channel or swale. Rock check dams should consist of well-graded stone consisting of a mixture of rock sizes.

When used in dry water quality swales, the height of the check dam shall be no less than the elevation associated with the Water Quality Volume (1/2 inch or 1-inch times contributing impervious surface).

Exercise care in designing the ends of a check dam to ensure that it is long enough and adequately anchored to prevent ponded water from scouring the soil at the ends, and flowing around the dam.

Some check dam designs may require weirs. For example, if the same check dam is used for water quality treatment (for the water quality volume), and to lag the peak rate of runoff (for the velocity associated with runoff from the 2-year storm), a weir must be included as part of the check dam design. In instances where a permanent check dam is to be used for both water quality treatment and lag peak flows with a weir, use a durable material such as concrete. If the check dam is constructed from stone such as pea gravel, the weir would most likely lose its shape when higher velocities occur.

Maintenance

Inspect check dams after every significant rainfall event. Repair damage as needed. Remove sediment as needed.

Adapted from:

Caltrans, Storm Water Quality Handbooks. Section 4. SC-4 P.

MassDEP, Massachusetts Nonpoint Source Pollution Management Manual, 2006.

http://www.mass.gov/dep/water/laws/policies.htm#storm

OUTLET STRUCTURES

Description

Outlets of BMPs are devices that control the flow of stormwater out of the BMP to the conveyance system.

Outlet Protection Design in Relation to Receiving Wetlands

This section describes the various types of common outlets such as flared end structures, risers, single-stage outlets, and multi-stage outlets. Considerations include setting back the outlet from a brook, providing appropriate energy dissipation, and orientating the outlet to reduce scour effects on the opposite bank.

Alignment of Outlets into Regulatory Streams

The Wetlands and 401 regulations require that stormwater treatment be provided prior to discharge into wetland resource areas such as vegetated wetlands (BVW, IVW, salt marshes), land under water (streams, lakes, rivers, ponds, ocean), and other resource areas, except for Riverfront Areas ILSF, BLSF, and land subject to coastal zone flowage, where such practices may be sited, provided the structures meet the performance standards specified in the Wetland regulations applicable to all projects.

The impact of new pipe outfalls on wetlands can be significantly reduced by locating the outfall point back from the receiving stream, using a flared-end structure, installing riprap or bio-engineered splash pad, and either digging a channel from the outfall to the stream or designing the splash pad to act as a level spreader to sheet the discharged stormwater to the stream.

In addition to not placing the outfall and energy dissipation in a wetland resource area such as a BVW or LUW, care must be exercised in the outlet design to ensure its orientation is such to reduce scour at the entry point and opposite bank. The preferred approach is to end the outlet pipe at a headwall or flared-end structure with a riprap or bio-engineered splash pad, discharging to a manmade drainage swale that is aligned at no more than a 45 degree angle to a stream channel. Design the outlet point and riprap or bio-engineered splash pad to reduce the energy sufficiently to eliminate a need to install riprap on the bank opposite the outfall point to protect it from scour.

References for BMP Accessories:

Note that sections of the Massachusetts Stormwater Update were adapted from a variety of manuals, checklists and other references in the public domain previously developed by other states and federal agencies, including:

Caltrans, Storm Water Quality Handbooks. 2003. (http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm)

Connecticut Department of Environmental Protection. Connecticut Stormwater Quality Manual. 2004. (http://dep.state.ct.us/wtr/stormwater/strmwtrman.htm)

Idaho Department of Environmental Quality. Catalog of Stormwater BMPs for Cities and Counties. March 2003. (http://www.google.com/u/DEQ?q=stormwater&domains=www.deq.idaho.gov&sitesearch=www.deq.idaho.gov)

Maine Department of Environmental Protection. Maine Stormwater Best Management Practices Manual. January 2006. (http://www.maine.gov/dep/blwq/docstand/stormwater/stormwaterbmps/index.htm)

Maryland Department of the Environment. Maryland Stormwater Design Manual, Volumes I and II, October 2000. (http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp)

New Jersey Department of Environmental Protection. New Jersey Stormwater Best Management Practices Manual. April 2004. http://www.state.nj.us/dep/stormwater/bmp_manual2.htm

U.S. Department of Transportation. Federal Highway Administration. Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring. (Undated). (http://www.fhwa.dot.gov/environment/ultraurb/index.htm)

U.S.Environmental Protection Agency. Office of Research and Development. The Use of Best Management Practices (BMPs) in Urban Watersheds. EPA/600/R-04/184. September 2004.

Vermont Agency of Natural Resources. The Vermont Stormwater Management Manual. April 2002. (http://www.vtwaterquality.org/stormwater.htm)

Catch Basin Inserts

Description

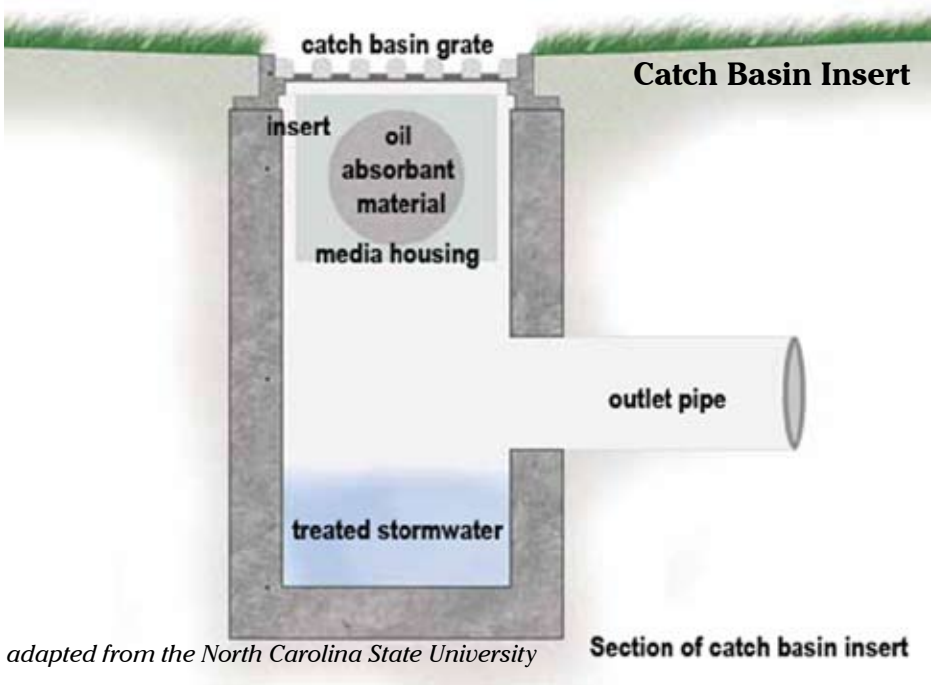
Catch Basin Inserts are a BMP accessory recently developed to add filtering efficiency to traditional catch basins. These proprietary BMPs are capable of removing a range of pollutants, from trash and debris to fine sediments and oil/grease and metals depending upon the filtering medium used. They typically have three components:

- an insert that fits in into the catch basin
- absorbent material (can be a single unit or a series of filters)
- a housing to hold the absorbent material

Applicability and Planning Considerations

Catch Basin Inserts can be useful for specialized applications, such as targeting specific pollutants other than TSS, at Land Uses with Higher Potential Pollution Loads, for oil control at small sites, for retrofits of existing catch basins with no or undersized sumps, to add TSS capability to areas with higher sediment loading, or to improve existing conditions at size-constrained sites (e.g., catch basins near bathing beaches).

If using a proprietary Catch Basin Insert, the manufacturer's specifications must be followed, which may include modifications to the catch basin. Such modifications may include a high flow bypass or other feature to handle clogging or larger storm events.



adapted from the North Carolina State University

Catch Basin Inserts are typically designed for and used for smaller volume applications. Additionally, larger sized sediment can clog and significantly reduce the effectiveness of some Catch Basin Insert filtering media. Therefore it is important to ensure that flow rates, sediment removal, and the frequency of inspection and maintenance are evaluated.

Design and Construction

Since Catch Basin Inserts are usually proprietary devices, the manufacturer should be asked to ensure that the device will work in the type of catch basin in which it is installed. Flow characteristics and sediment loading should be evaluated and any resulting modifications to the catch basin made before installation of the insert.

Maintenance

Inspect Catch Basin Inserts per the manufacturer's schedule, and especially after large rainfall events. Whoever is responsible for maintenance should explicitly agree to conduct the maintenance per the manufacturer's recommendation and to lawfully dispose of the cleanings or used filtration media.

Deep Sump Catch Basin

Description: Deep sump catch basins, also known as oil and grease or hooded catch basins, are underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff, and serve as temporary spill containment devices for floatables such as oils and greases.

Ability to meet specific standards

Standard	Description
2 - Peak Flow	Provides no peak flow attenuation
3 - Recharge	Provides no groundwater recharge
4 - TSS Removal	25% TSS removal credit when used for pretreatment. Because of their limited effectiveness and storage capacity, deep sump catch basins receive credit for removing TSS only if they are used for pretreatment and designed as off-line systems.
5 - Higher Pollutant Loading	Recommended as pretreatment BMP. Although provides some spill control capability, a deep sump catch basin may not be used in place of an oil grit separator or sand filter for land uses that have the potential to generate runoff with high concentrations of oil and grease such as: high-intensity-use parking lots, gas stations, fleet storage areas, vehicle and/or equipment maintenance and service areas.
6 - Discharges near or to Critical Areas	May be used as pretreatment BMP. not an adequate spill control device for discharges near or to critical areas.
7 - Redevelopment	Highly suitable.

Advantages/Benefits:

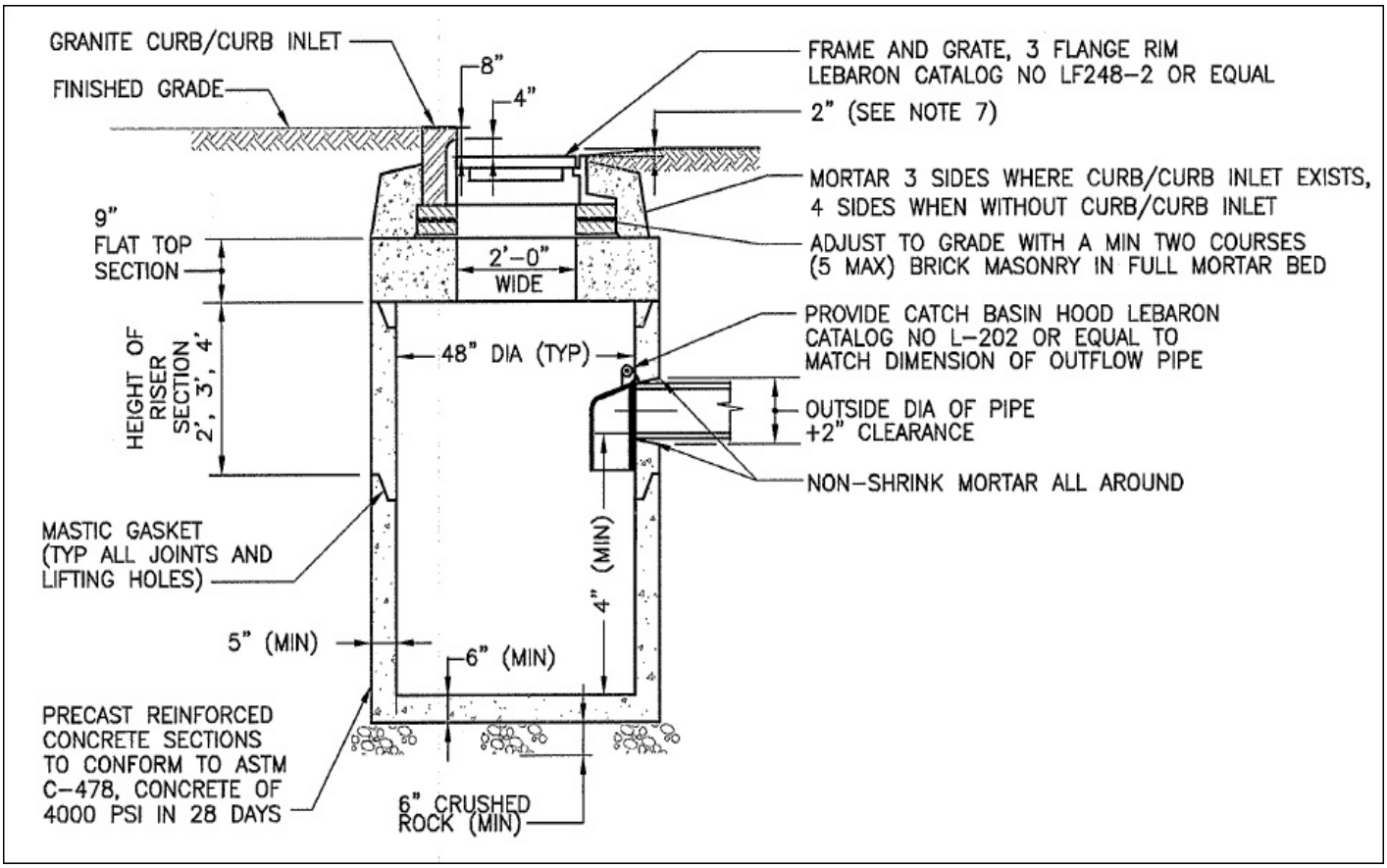
- Located underground, so limited lot size is not a deterrent.
- Compatible with subsurface storm drain systems.
- Can be used for retrofitting small urban lots where larger BMPs are not feasible.
- Provide pretreatment of runoff before it is delivered to other BMPs.
- Easily accessed for maintenance.
- Longevity is high with proper maintenance.

Disadvantages/Limitations:

- Limited pollutant removal.
- Expensive to install and maintain, resulting in high cost per unit area treated.
- No ability to control volume of stormwater
- Frequent maintenance is essential
- Requires proper disposal of trapped sediment and oil and grease
- Entrapment hazard for amphibians and other small animals

Pollutant Removal Efficiencies

- Total Suspended Solids (TSS) - 25% (for regulatory purposes)
- Nutrients (Nitrogen, phosphorus) - Insufficient data
- Metals (copper, lead, zinc, cadmium) - Insufficient data
- Pathogens (coliform, e coli) - Insufficient data



adapted from the University of New Hampshire

Maintenance

Activity	Frequency
Inspect units	Four times per year
Clean units	Four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Special Features

All deep sump catch basins must include hoods. For MassHighway projects, consult the Stormwater Handbook for Highways and Bridges for hood requirements.

LID Alternative

Reduce Impervious Surface
Disconnect rooftop and non-rooftop runoff
Vegetated Filter Strip

Deep Sump Catch Basin

Suitable Applications

- Pretreatment
- Residential subdivisions
- Office
- Retail

Design Considerations

- The contributing drainage area to any deep sump catch basin should not exceed ¼ acre of impervious cover.
- Design and construct deep sump catch basins as off-line systems.
- Size the drainage area so that the flow rate does not exceed the capacity of the inlet grate.
- Divert excess flows to another BMP intended to meet the water quantity requirements (peak rate attenuation) or to a storm drain system. An off-line design enhances pollutant removal efficiency, because it prevents the resuspension of sediments in large storms.

Make the sump depth (distance from the bottom of the outlet pipe to the bottom of the basin) at least four feet times the diameter of the outlet pipe and more if the contributing drainage area has a high sediment load. The minimum sump depth is 4 feet. Double catch basins, those with 2 inlet grates, may require deeper sumps. Install the invert of the outlet pipe at least 4 feet from the bottom of the catch basin grate.

The inlet grate serves to prevent larger debris from entering the sump. To be effective, the grate must have a separation between the grates of one square inch or less. The inlet openings must not allow flows greater than 3 cfs to enter the deep sump catch basin. If the inlet grate is designed with a curb cut, the grate must reach the back of the curb cut to prevent bypassing. The inlet grate must be constructed of a durable material and fit tightly into the frame so it won't be dislodged by automobile traffic. The inlet grate must not be welded to the frame so that sediments may be easily removed. To facilitate maintenance, the inlet grate must be placed along the road shoulder or curb line rather than a traffic lane.

Note that within parking garages, the State Plumbing Code regulates inlet grates and other stormwater management controls. Inlet grates inside parking garages are currently required to have much smaller openings than those described herein.

To receive the 25% removal credit, hoods must be used in deep sump catch basins. Hoods also help contain oil spills. MassHighway may install catch basins without hoods provided they are designed, constructed, operated, and maintained in accordance with the Mass Highway Stormwater Handbook.

Install the weep hole above the outlet pipe. Never install the weep hole in the bottom of the catch basin barrel.

Site Constraints

A proponent may not be able to install a deep sump catch basin because of:

- Depth to bedrock;
- High groundwater;
- Presence of utilities; or
- Other site conditions that limit depth of excavation because of stability.

Maintenance

Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. One study found that once 50% of the sump volume is filled, the catch basin is not able to retain additional sediments.

Inspect or clean deep sump basins at least four times per year and at the end of the foliage and snow-removal seasons. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. If handling runoff from land uses with higher potential pollutant loads or discharging runoff near or to a critical area, more frequent cleaning may be necessary.

Clamshell buckets are typically used to remove sediment in Massachusetts. However, vacuum trucks are preferable, because they remove more trapped sediment and supernatant than clamshells. Vacuuming is also a speedier process and is less likely to snap the cast iron hood within the deep sump catch basin.

Always consider the safety of the staff cleaning deep sump catch basins. Cleaning a deep sump catch basin within a road with active traffic or even within a parking lot is dangerous, and a police detail may be necessary to safeguard workers.

Although catch basin debris often contains concentrations of oil and hazardous materials such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Unless there is evidence that they have been contaminated by a spill or other means, MassDEP does not routinely require catch basin cleanings to be tested before disposal. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept solid waste, without any prior approval by MassDEP. However, some landfills require catch basin cleanings to be tested before they are accepted.

With prior MassDEP approval, catch basin cleanings may be used as grading and shaping materials at landfills undergoing closure (see Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites) or as daily cover at active landfills. MassDEP also encourages the beneficial reuse of catch basin cleanings whenever possible. A Beneficial Reuse Determination is required for such use.

MassDEP regulations prohibit landfills from accepting materials that contain free-draining liquids. One way to remove liquids is to use a hydraulic lift truck during cleaning operations so that the material can be decanted at the site. After loading material from several catch basins into a truck, elevate the truck so that any free-draining liquid can flow back into the structure. If there is no free water in the truck, the material may be deemed to be sufficiently dry. Otherwise the catch basin cleanings must undergo a Paint Filter Liquids Test. Go to www. Mass.gov/dep/recycle/laws/cafacts.doc for information on all of the MassDEP requirements pertaining to the disposal of catch basin cleanings.

NOTES:

NOTES:

1. EXISTING CONDITIONS AND TOPOGRAPHY TAKEN FROM SURVEY TITLED "TRI-COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL TOPOGRAPHIC PLAN OF LAND" PREPARED BY SAMPSTED CORBO TAATA, INC. EXISTING DIRECTIONS AND TOPOGRAPHY AGREE FROM SURVEY TITLED "TRI COUNTY REGIONAL VOCATIONAL TECHNICAL HIGH SCHOOL TOPOGRAPHIC PLAN OF LAND" PREPARED BY SAMTES CONSULTANTS, INC. AND DATED 05-13-2024
2. [illegible]

LEGEND:

- PROPOSED STORM DRAINAGE LINE
- PROPOSED WATER LINE
- PROPOSED FIRE PROTECTION LINE
- PROPOSED SANITARY SEWER LINE
- PROPOSED KITCHEN WASTE LINE
- PROPOSED GAS LINE
- PROPOSED UNDERGROUND ELECTRIC LINE
- PROPOSED TELEPHONE LINE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED STORM DRAINAGE MANHOLE
- PROPOSED WATER QUALITY UNIT
- PROPOSED CATCH BASIN
- PROPOSED DOUBLE CATCH BASIN
- PROPOSED AREA DRAIN
- PROPOSED HYDRANT
- PROPOSED POST INDICATOR VALVE
- PROPOSED GAS GATE VALVE
- PROPOSED WATER GATE VALVE
- PROPOSED TAP AND SLEEVE VALVE
- PROPOSED SITE LIGHTING (SEE LA AND ELECTRICAL PLANS FOR DETAILS)
- PROPOSED DIRECTIONAL FLOW

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83)

70 35 0 70 140

1 inch = 70feet

DRA

Drummey Rosane Anderson, Inc.

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02453

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Tri-County Regional Vocational Technical High School

147 Pond St, Franklin, MA 02038

BID SET #01
SITE ENABLING
CONTRACT
DOCUMENTS

05/08/2024

KEY PLAN

PROJECT NORTH | MAGNETIC NORTH

STORMWATER MANAGEMENT KEYSHEET

Scale: 1"=70'
Project: 52033.00
Author: GJM
Date: 05/02/2024

C500

APPENDIX 7:
ILLICIT DISCHARGE COMPLIANCE

ILLICIT DISCHARGE COMPLIANCE STATEMENT

SITE ADDRESS: 147 Pond Street Franklin, MA

OWNER/APPLICANT: Karen Maguire (School Superintendent)

PLAN REFERENCE: Tri-County Regional Technical HS C500-C505 Stormwater Management Plan

DATE: 03/21/2024

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system.

Through the implementation of the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system. Further, I certify that the stormwater management system as shown on the referenced plan will be maintained in accordance with the conditions of the Long-Term Pollution Prevention Plan.

NAME: Karen M. Maguire

SIGNED: Karen M. Maguire

DATE: 3/20/24